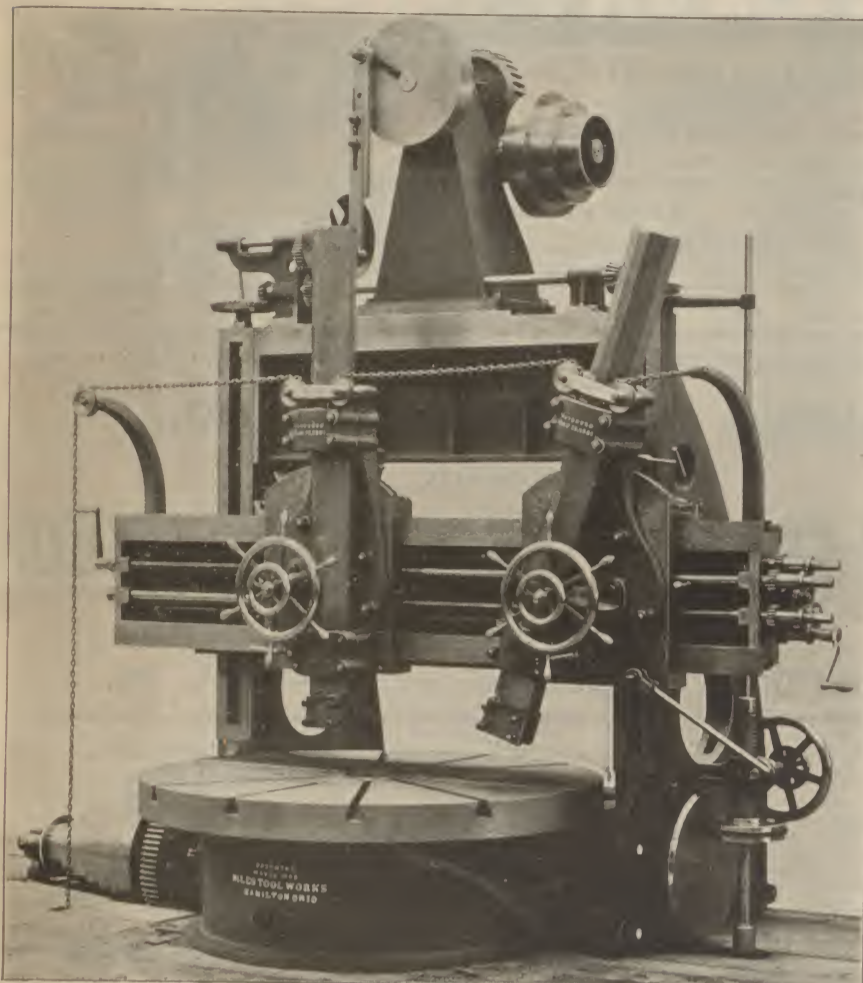


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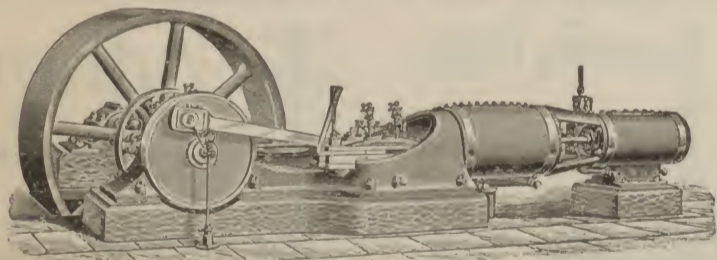
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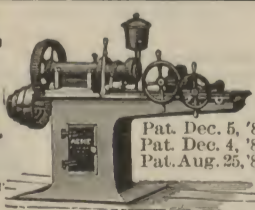
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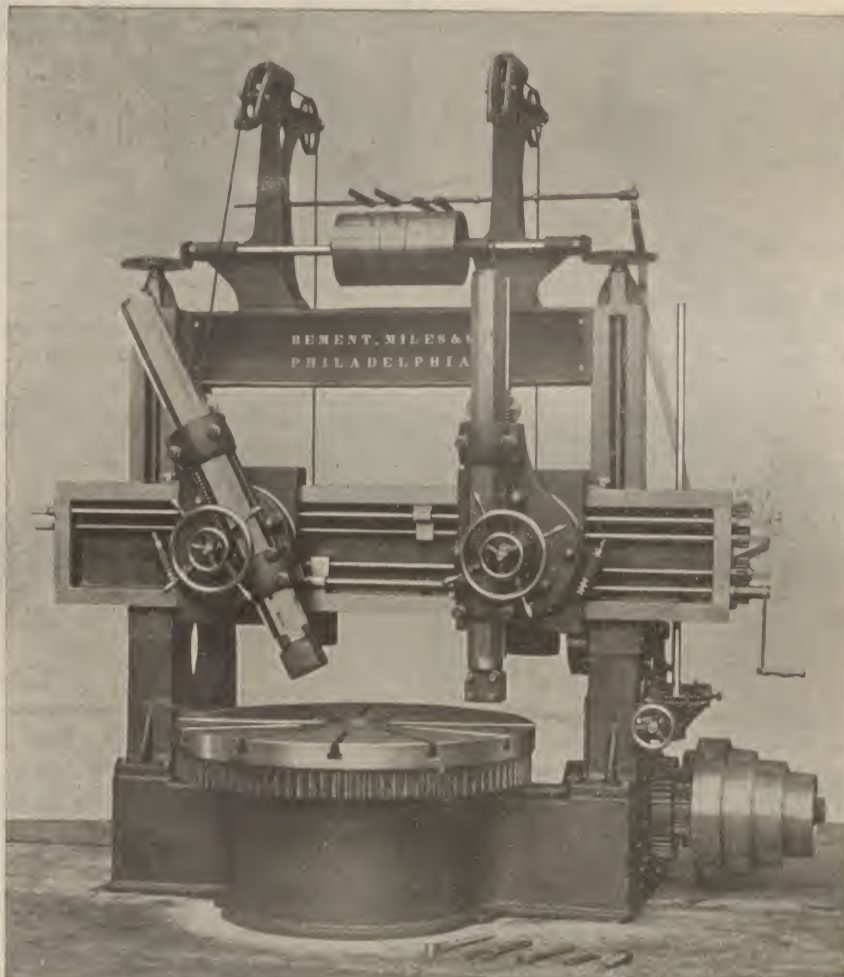


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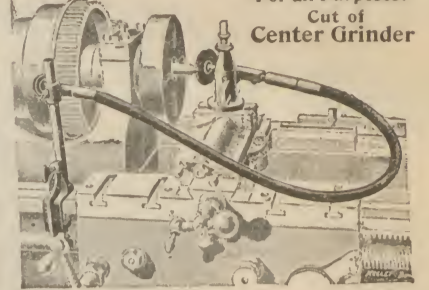
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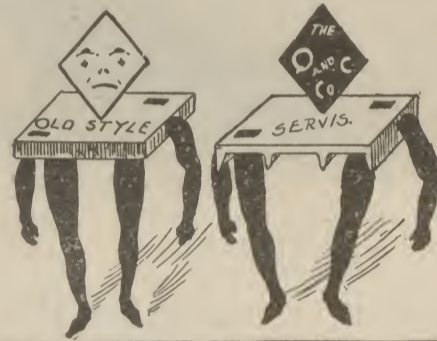
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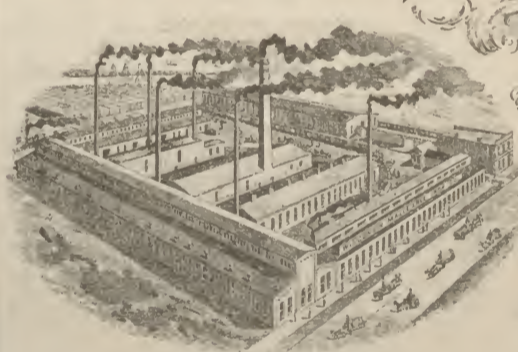
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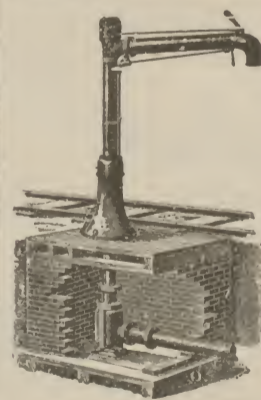
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# THE RAILWAY REVIEW

XXXVI.

MAY 16, 1896.

No. 20.

**TELEPHONING BY WATER.**—The United States lighthouse board has demonstrated that telephoning can be carried on at sea with vessels near shore. An iron-armored submarine cable was laid from Sandy Hook at the power station of the Gedney Channel Electric Buoy System, out to the Scotland Lightship, five statute miles, of which one-half mile was underground across the Hook. A copper wire gridiron arrangement was fixed at the end of this cable, and by this and other methods, an electrical diffusion area was created, different electrical potentials, sufficient for practical purposes, being found at any two points 100 feet or so apart on the water's surface. The lighthouse tender *Gardenia*, suitably equipped with transmitting and receiving circuits, found that there were over sixteen acres of water around the lightship throughout which telephonic conversation could be carried on with Sandy Hook station, and while under full steam. As the *Gardenia* has a wooden hull without sheathing, two plates of sheathing metal seven feet by three feet were attached to bow and stern, and wires run from them to the pilot-house. The plates were about 113 feet apart and sufficient potential difference existed over the sixteen acres to operate the telephone well.

**CORROSION IN STEEL SHIPS.**—English shipping journals are discussing more than ever, just now, the question of deterioration which is taking place in ships built of steel. Managers of vessels are becoming so alarmed that they are now specifying a large portion of the work to be of iron, such as the upper decks, floors, tank tops, etc. Some of the manufacturers of steel have been making experiments to determine whether it is really the case that steel corrodes more quickly than iron. In one case experiments were carried out by means of plates of various thicknesses being exposed in both fresh and salt water for periods from one month up to a couple of years, with the result that the steel plates exposed for a period up to six months corroded much faster than the iron ones, but after that the advantage lay with the steel, those exposed for two years being in a much better condition than the iron ones. It is claimed also that ships built of steel within the last few years do not show the same inclination to corrode, from the fact that the manufacture of steel is better understood. None of the associations of naval architects have given this subject serious attention, although it would seem that there is room for careful research regarding it.

**PITTSBURGH'S LATEST RAILROAD.**—In these days when so many railroads are built on paper alone, it is refreshing, says the *Manufacturers' Record*, to note the beginning of a project which is to be put through. Such is the new Butler & Pittsburgh Railway which was organized a few days ago. Mr. Andrew Carnegie, chairman of the board of directors, has subscribed \$2,500,000 of the \$3,000,000 required to build this road. This line, although short, will be a very important one. Its entire length will be but 40 miles. It will run from the Edgar Thomson Steel Works, at Braddock, to Butler, where it will connect with the Pittsburgh, Shenango & Lake Erie Railroad. Its route will be along the Allegheny river to Deer creek and up the creek straight to Butler. This line will doubtless have quite an influence on the ore carrying trade, as it will furnish the Pittsburgh district another outlet to the lakes. Work on the new line is to be commenced at once, as the secretary of the company has been authorized to advertise for bids on construction. This road will further assist Pittsburgh in meeting that fast growing tendency to move the iron manufacturing industries toward the lake region.

**HEATING VALUE OF VOLATILE MATTER IN BITUMINOUS COAL.**—In the April number of the *Stevens Indicator* Mr. Wm. Kent has an article on the heating value of the volatile portion of bituminous coal, in which he urges the need of data obtained from actual tests, and outlines a series of experiments which he thinks would add greatly to the available knowledge on this subject. He says: Two questions upon which the proposed research may throw some light are: (1) What is the character of the volatile matter of the more highly bituminous coals; and (2) may it not be commercially practicable to get rid of the least valuable portion of this volatile matter, by some kind of coking process, at the coal mines, and save freight not only upon it, but also on so much of the fixed carbon which is wasted in the ordinary boiler furnace in the operation of distilling the volatile matter? If any of the western coals containing high percentages of oxygen contain it in such chemical combination that it can be removed at a comparatively low temperature at the coal mine, it would appear that a partial coking of these coals at the mine would be commercially practicable. Even if the oxygen cannot be removed except at a high temperature, it may be found that it carries with it in distillation the valuable by-products which are obtained in the Otto-Hoffman and the Smet-Solvay coking processes, and that their extensive introduction in the west would pay. There is a possibility of fractional distillation of western coals giving three valuable products, first, gas approximating in composition to natural gas or methane,  $\text{CH}_4$ , which could be utilized in factories within a certain distance; second, ammoniacal tar waters, containing valuable sub-

stances for use as fertilizers or in the chemical industries; third, smokeless coal or coke, which would be the final solution of the smoke problem in the western cities. —American Engineer, Car Builder and Railroad Journal.

**AUTOMATIC BRAKES AND THE PULING UP OF EXPRESS TRAINS.**—Reporting on the recent accident on the Great Northern Railway at Little Bytham, on March 7th last, when a passenger express at 70 miles an hour left the rails owing to defective ballast on a section of new line, Major Marindin says that at first sight it was difficult to understand how a train fitted with a continuous brake could have run for so great a distance as 900 yards after the brake was applied, even when running at 70 miles an hour on a falling gradient of 1 in 174 to 1 in 200, with very greasy rails; but when it transpired that, owing to only half the wheels on the eight wheeled carriages being braked, the proportion of the total weight of the train braked was less than two-thirds, the fact was explained. In this particular case no great evil resulted from the distance run after the brake was automatically applied, for it was not until the rear carriages were wrecked, or momentarily before, that the automatic reaction occurred, but it may not always be so, and the value of a rapid stop in many cases can hardly be over estimated. It is, therefore, more desirable that the break blocks should be attached to all wheels possible, and also that the adoption of quick action brakes should be seriously considered, the rapidity with which a brake can be brought into action throughout a long train, and the consequent reduction of speed in the first second or two, being of supreme importance.

**AN UNUSUAL MISHAP.**—The *Marine Review* notes an accident to the steamer *Argonaut* on Lake Michigan which was one of the most unusual mishaps ever recorded in connection with steam navigation on the lakes. There was no explosion of either boiler or steam chest as reported in early telegraphic reports of the accident, and yet the four columns of the frame of the steeple compound engine, with which the steamer is fitted had collapsed, causing a scene of wreck and confusion in the engine room, such as is seldom encountered. The *Argonaut* was proceeding up Lake Michigan, loaded, and was being urged along at her best speed. Suddenly there was a crash, followed by a rush of steam which blew out the side and front of the house over the engine. The four columns of the engine frame had broken simultaneously, letting the cylinders topple backward against the combing of the engine space, and the toppling of the cylinders had caused the steam pipe connections at the check valve to break. Thus the immense body of steam so suddenly released rushed in a direction opposite to the point where those nearest the engine were located and not the slightest injury resulted to them. Some of the working parts of the engine were bent but not ruined and the engine can be put in shape for further service, though not without some expense and delay. New frame columns will have to be provided and the working parts subjected to an overhauling. The columns undoubtedly broke as a result of the springing of the frame while the engine was being worked up to its fullest power. The *Argonaut* is not a new vessel, and the bed timbers upon which the engine rests have probably lost much of their firmness, and the lack of rigidity in the engine under working pressure was largely due to this fact.

**JAPANESE RAILWAYS.**—A more than usually interesting report on the railways of Japan has lately been issued by the Foreign office, in which a graphic diagram is given of the progress of railways in the country, several views of the railways, and a general railway map. The report shows that on March 1, 1895, the total mileage of railways open to the public was 2,118, of which government lines amounted to 580, and private lines to 1,538 miles. In addition there were 1,072 miles uncompleted, while apparently about 1,000 miles of line are contemplated, excluding Formosa. Mr. Lowther, the compiler, an Englishman, calls attention to the vital necessity of British manufacturers of railway material taking every possible measure to advance their interests in Japan. The railways of Japan have been built under foreign, it might almost be said British, advisers. Hence it was convenient that the materials required for carrying out designs made by English engineers should be obtained in England. The influence of English engineers could not fail to make itself felt in that direction; but the tendency of the Japanese government is to dispense with all foreign advice, and the time may not be remote when all Japanese lines, whether government or private, will be built and managed without any assistance from the foreigner in Japan, and the material alone will be purchased abroad. In Great Britain the leading firms order from designs made by their own engineers, and manufacturers have nothing to do with the preparation of the designs. In America, on the other hand, there exists a system under which the railway companies state their requirements and the manufacturers send in competitive projects based on their own designs. The English engineer who has been the designer of railway bridges in Japan since 1882 is leaving the country. On his departure, if the Japanese engineers have structures with which they are unable to deal, it will be most easy for them to adopt the American system and get both design and bridge from the manufacturers, thus transferring the business to America. American firms are careful to be represented in Japan, while only some of the most important British firms have agents there. Hence Mr. Lowther thinks that British manufacturers of railway material would find it advantageous to be properly represented in Japan, as large shipbuilding firms have been with success, and, as there are evident signs of a "boom" in railway enterprise in Japan, it is important that the matter should be attended to without delay.

**THE JUNGFRAT RAILWAY.**—Competitive plans are desired by the Bureau der Jungfraubahn, Bahnhofstrasse 10, Zurich, for the proposed railway to the summit of the Jungfrau. The sum set apart for the purpose of making awards to the successful competitors is about \$6,000. The prizes in question are offered for the best solution of three different groups of problems. The first of these relates to the construction of the line, and plans are desired showing the tunnel profile, the lining if any, the kind of permanent way and superstructures proposed; the racks, points and switches. The question of electrical power transmission from the falls on the Lutschine river is also included in the first group, together with the designs for the cars, stations, club buildings and elevator from the last station to the mountain summit. The lift of the elevator is fixed at 328 feet, and the shaft is to be 26 feet in diameter, and to be provided with stairways. In the second group of problems, proposals are required for methods of executing the work, the driving of the tunnels, removal of spoil, and of precautions for the safety of the men. The third group is concerned with the working of the line, and competitors should deal with the question of maintenance of the way, the electric lighting of the tunnel, cars and stations, and with heating of the two latter by the same agent. Finally, the security of the passengers and staff should also be considered in this connection. Such plans as are sent in will be considered by experts, on whose recommendations the premiums will be awarded. Successful competitors will have no further claim on the committee, as the prize is to be considered as payment in full for the use of the premium designs. Unsuccessful designs will be restored to their originators and will remain their private property. The maximum gradient of the proposed line is fixed at 1 in 4, and the minimum radius of curvature at 328 feet. The maximum width of the cars must not exceed 8.2 feet, and the greatest height 9.84 feet. The speed has been fixed at from 4.3 to 6.2 miles per hour. The water power available is 5,000 horse power effective. The falls are situated at about 5 miles from the proposed starting point of the line, which will be about 1.5 miles from the tunnel portal. The total length of tunnel will be about 6.2 miles. The latest date for sending in proposals is August 1 next.

**LONG PILES.**—Piles from 100 to 105 ft. long are being used by the Tacoma Land Co., of Tacoma, Wash., in replacing a portion of its sea-wall with a pile and stringer wharf. The water is 30 ft. deep and the outer row of piles range from 100 to 105 ft. in length, 10 in. diameter at the tip and 22 in. at the butt. The piles are made from the "Washington Fir" (the Douglass pine), and from the same timber a few piles were cut and recently used, 120 ft. long and 24 in. at the butt. Sticks 90 ft. long, three car lengths, in squared timber are often shipped east; and it is expected that changes in the alignment of the railway will soon permit the shipping of 100 ft. lengths.

**BALLASTING TIES.**—It used to be the rule on many roads to fill in the center of track to a high level with top of rails, but as rails increased in size, this custom has fallen behind; in fact, it has been a question in the minds of many trackmen what was to be gained by putting so much dirt over the center of ties. The answer was that track must be filled in in such a manner as to form a water shed or roof to turn rain, and thus prevent the softening of the ballast beneath the ties that would occur if penetrated by water. Then the next question is, how high should this shed or roof be in order to serve this purpose? This, of course, depends on the kind of ballast used. If it is ordinary soil or loam, two and one-half inches over the center of the ties and gradually rounded down to within 8 in. of the rail, and from thence a straight line to the end of ties will be found sufficient. It is supposed by many that the more dirt that covers the ties the better the track will stay in line, but this is an error, which anyone may demonstrate to their own satisfaction in the following manner. First, to show that it is the dirt between the ties that hold most, pull the spikes out of two adjoining old ties that you intend to remove from the track, raise the rails and put a spike under each on one of the old ties; then shovel the dirt off level with the top of the other and try to pull it out. You cannot do it. Now, to show that the amount of dirt on top of a tie will not hold it in place, dig the dirt away from each side of the next old tie down to the bottom, but leave the dirt on top; then raise rails as before and you will find that with the sides free the 20 or 25 lbs. of dirt on top of the tie has no perceptible influence on the movement of the tie. It may be seen from this that it would be impracticable to put enough dirt over the ties to counteract the lurch of a train. As a matter of fact, track will remain in line as long as the weight of trains is distributed equally on both rails, but when one rail is loaded more than the other, it will settle down, which soon causes a "swing," and the track is moved out of line more or less by every passing train. With these facts before us, it would be a reckless assertion to say that perfectly level track, even with no dirt between ties, could move sideways under a load, or that a few inches of dirt over the ties could hold poor track in good line. It follows, therefore, that only sufficient dirt should be placed in the track to turn rain; more would be a detriment to the life of the ties. On roads ballasted with sand, gravel or cinders, the conditions are different, because none of the ballast mentioned can be arranged to prevent rains penetrating them, their porous nature permitting an ordinary rain to soak through almost as fast as it falls. Indeed, the chief value of such ballast consists of its stability, even when saturated with water. If fine sand is used, it will pack closer than gravel or cinders, and will turn some rain, if slightly rounded in the middle of track. If the center of ties are covered

with about 1 inch, it will be found sufficient, although this is not necessary, if the ties have a good bed of sand beneath. With coarse sand, gravel or cinders, it is not necessary to fill in more than enough to bring the ballast even with the top of the ties from rail to rail. More than this would not turn water nor hold the track in line, and would prove injurious on account of its tendency to hasten the decay of ties. — [Jerry Sullivan, in Roadmaster and Foreman.

### ELECTRIC LOCKING, ANCIENT AND MODERN

V. SPICER.

It is confidently assumed that the track circuit is familiar to all. The history of its invention by Mr. Robinson, in 1872, and of its experimental and practical application to signaling in its various forms on railroads for the past twenty years, is interesting, and has been extensively written up and discussed. Its application in connection with electrical locking of the levers of an interlocking machine, although more or less practiced in past years, has not been sufficiently general to have become equally familiar.

It is intended to treat here of some historical facts and a personal experience with electric locking of levers of various forms of interlocking apparatus. The first interlocking machine erected in this country was imported from Saxby & Farmer England, and put in operation on the New York division of the Pennsylvania Railroad near Newark, N. J., in 1874. This machine is now in the collection of railway relics at the Columbian museum in Chicago. It is the type from which most of the interlocking machines in use have been copied. Before touching on the manner in which electric locking of levers has been done in the past and the reasons why such locking has been considered advisable, it may not be amiss to look over the arrangement of mechanical locking of such a machine. The locking is designed and applied to an interlocking machine for the purpose of regulating the order in which levers shall be operated in such a manner that those attached for the movements of switches, locks and signals of routes shall require those for the movements of similar functions in conflicting routes to be locked against being cleared. That is, in order to set the switches for a route, lock them and clear the signals for the passage of a train, all opposite or conflicting routes must be prevented. This is all that can be provided for with the mechanical locking, and, under well disciplined levermen, where slow movements of trains are the rule, this is practically all that can be required, and admit of expeditious handling of the traffic. Detector bars prevent the throwing of locks and switches under moving trains, and levermen are dependent on to use proper care in the manipulations. Where high speeds of trains are indulged in, however, although the same precautions in locking and handling are observed, a like amount of dependence on levermen cannot safely be placed, and practice has shown it to be absolutely necessary, to prevent careless or premeditated changes in routes once given for such movements. The probable meeting of trains at a junction or a crossing, or running into an open drawbridge, provided with carefully handled interlocking apparatus, is remote. The possibility exists, however, since there is no physical check on levermen to prevent them from clearing the route and during the passage of the train, and before it has arrived on the switches, reverse these and clear the route for a conflicting movement, causing a derailment or a collision and consequent wreck, not only to the train but to the apparatus. The distant signal at "clear," under these conditions, becomes a very dangerous thing, as it invites high speeds and increases the disastrous effects of a derailment or collision.

It was pretty clearly seen in the early days of interlocking in this country, that means for preventing these dangers were necessary. These were sought by the exploiters. The Jackson Switch & Signal Company of Harrisburg, Pa., had secured the Saxby & Farmer and Toucey & Buchanan patents for interlocking machines. They had erected several plants in 1879-80 and the repeated accidents caused by levermen reversing routes before trains had cleared the interlocked region, set them to thinking how to prevent them. Electricity was suggested and Mr. Jackson devised and patented a scheme for attaching an electro magnet to operate a latch arranged to lock the signal levers in their clear positions by means of the train in the section. In 1872 Wm. Robinson invented and patented the rail circuit, illustrated in Fig. 1, and in company with Oscar Gassett, Israel Fisher

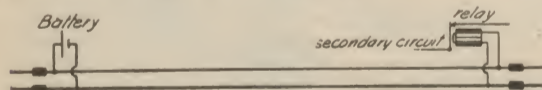


Fig. 1.

and others, developed a system of block signaling, employing this as the means for operating signals, locks on switchstands, highway crossing gates, alarm bells and annunciators. It took several years to demonstrate the practicability of the system and a great many devices for the purpose were experimented with before it was perfected. Tracks in those days, were not what they are today and difficulties existed which have since been largely eliminated. These men labored against great odds and spent much money and thought developing the first steps in an art which we, to-day, may learn in a few minutes. They devised and patented a lot of circuits, instruments etc. for signals, locks on switch stands, draw bridges, gates, etc., anticipating by several years what has only recently been considered seriously as being necessary. The same ground has been gone over by others, in recent

\*A paper read before the Railway Signaling Club May 12, 1896.

years, in most instances without a knowledge of what had already been done and many similar devices have been produced.

The earliest applications of the track circuit were made on the Fitchburg Railroad in Boston and its use in electrically locking switchstands and draw-bridge mechanism practically was first made on this and the Boston & Maine roads in 1878-79. Gassett equipped a number of switch stands with electric locks in the block signaled region, at Waltham, Mass., on the Fitchburg road. These were applied to the stands and so arranged, by using a secondary circuit, operated by the track relay in the section, as to lock the stand against being opened to throw the switch while a train was approaching in the block, as shown in Fig. 2. Provision was made for unlocking the

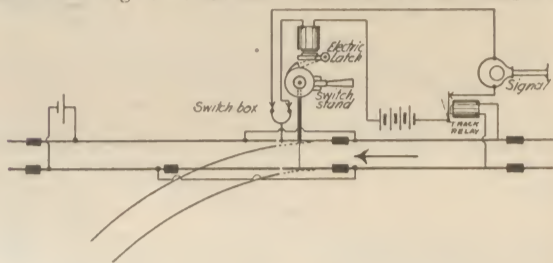


Fig. 2.

stand when it was necessary to operate into and out of the siding. The act of moving the switch from the line, opened the circuit by means of a shunt actuated by the points of the switch, causing the signal to show danger. Similar devices were applied on the Old Colony, Boston & Maine and Eastern Railroads, on draw bridges as well. It may be of interest here to state that the overlap system was introduced at this time on the B. & M. block signaling between Salem and Beverly.

In 1878 the Union Electric Signal Company was organized in Boston with Gassett as superintendent and electrician, and the devices he and others had invented as stock in trade. Jackson in his search for a means for electrically locking levers, came in contact with Gassett and soon after a consolidation of interests was brought about. It is not assumed here that this was the direct result of the meeting, but it occurred soon after. Gassett had devised a scheme for locking the levers of an interlocking machine, by means of electric latches operated both by the track instruments and track circuit. Jackson's device for the same purpose shown in Fig. 3 anticipated

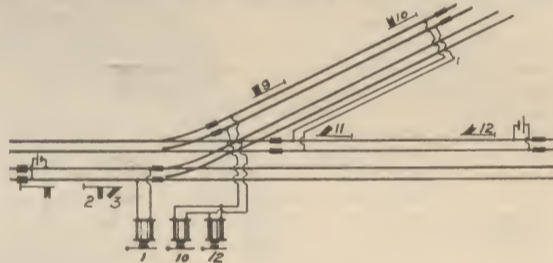


Fig. 3.

the use of the track circuit. One of Gassett's devices, provided for locking the signals as soon as a train had entered under a clear distant signal as shown in Fig. 4.

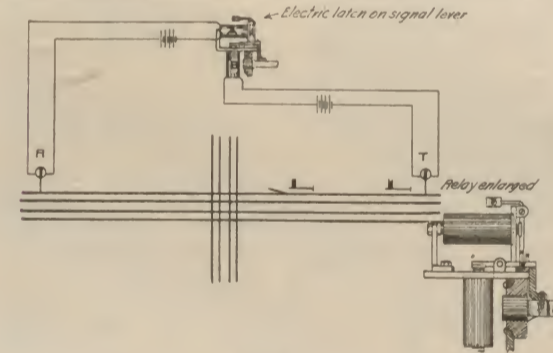


Fig. 4.

By means of a track instrument, or "treadle" T located near the distant signal, the wheels of the engine caused the circuit on the electric locking latch A on the signal lever to drop. This was held there and prevented from releasing by a second electric latch B which would release when the train had passed over and out of the interlocked region, striking a second track instrument R provided for the purpose. These ideas were identical in their purpose, which was to secure the route once given for the passage of a train over a certain point by electrically locking the signal levers in their positions for such passage and releasing them after it had been made. Later on Jackson took out a patent on a more extended use of his electric latch, which was to lock the levers of opposing routes in their normal or danger positions, instead of those of the route desired in their safety positions. In his application for a patent he showed the following conditions of tracks at a junction. Supposing a train Fig. 5, on track A to take the branch track D. The locks were applied on the levers operating the signals on track C holding them in the danger position to prevent clearing for a train on that track. Similarly, a train entering on track C would lock levers operating signals for track A to D and also levers operating signals for track B. This electric locking was to be actuated by the track circuit, extending from the vicinity of the distant signal to the crossing frogs. The circuit from each section of track

was carried direct to the magnets of the electric latches and did not provide for the use of a relay. We know now that this is not practical. Experience has demonstrated

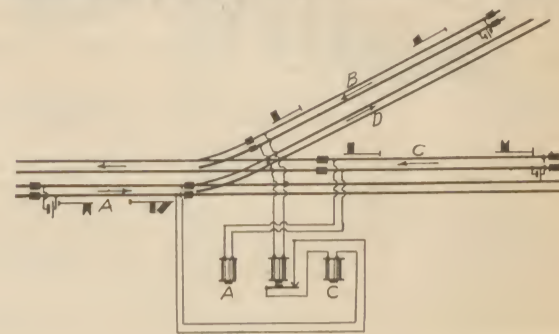


Fig. 5.

the impracticability of operating high resistance magnets and the necessary batteries directly through the tracks as part of the circuit, and, considering the fact that the ordinary interlocking accomplishes exactly what this scheme was designed to cover, the only feature of interest in the device, seems to be that it involved the electric locking of levers.

The electric locking of levers of manual, hydraulic and pneumatic interlocking machines was put into practical operation at various places during the years 1882-3-4-5 by the Union Switch & Signal Co., employing the track circuit for the purpose. The first application was made to the Saxby & Farmer machine in 1882 on the Pennsylvania Railroad, and provided for locking signal levers at safety by the train entering under the distant signal so set, as shown in Fig. 3. It soon became evident that this was not the proper principle, as it prevented the signals from being restored to danger until the train had passed beyond the interlocked point. This was changed, and an arrangement made that provided for locking the lock levers of switches, thus allowing the signal levers to be restored to the normal position as soon as the train had passed the signals, but secured the lock levers until the train had gone beyond the limits of the interlocking on single track lines and beyond the crossing frogs on double track lines. The expense of bond wiring and insulating the rails for such long distances led to a change in these arrangements, and the locking was made to take place on pulling the distant signals to clear. This was accomplished as shown in Fig. 6 by hav-

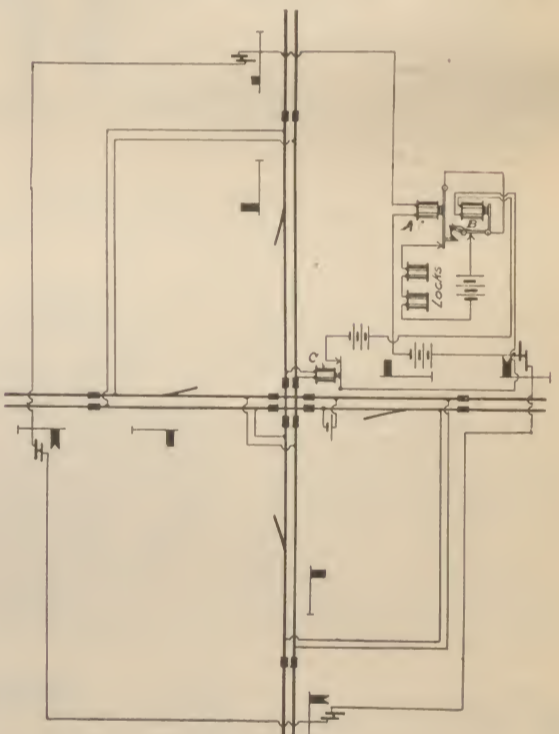


Fig. 6.

ing a circuit breaker operated by the blade itself on being pulled to clear, which opened the circuit of the electric latches on the lock levers by means of an interlocking relay in the tower. The signal could be restored to the danger position, but the train movement over the plant was necessary before the latch could be released. Here the tracks inside of the home signals are included in one common section supplied with a track battery and relay. The circuit controller on the distant signal on being opened by the blade at clear, causes the magnet A of the locking relay to discharge which in turn opens the circuit on the electric locks. The interlocking arrangement of the relay prevents closing this circuit again, until the magnet B has been discharged and again charged. The track relay C becomes discharged when the train enters the common track section and opens the circuit on B holding it open until the train has passed off the common section. As soon as B's circuit is opened A's armature bar is released and returns to its normal position closing its part of the lock circuit. But this circuit is looped through B's armature and requires B to close before the circuit can be completed. As long as the train remains in the section this cannot take place, by the reason of relay C being open. On passing off the common section C again recovers its current, and thus closes B's circuit restoring the electric latches and releasing the levers.

Fig. 7 shows another arrangement where circuit breakers are operated by the levers in the tower instead of on the distant signals. Theoretically, this was good, but in practice it involved much trouble. Levermen, by order,

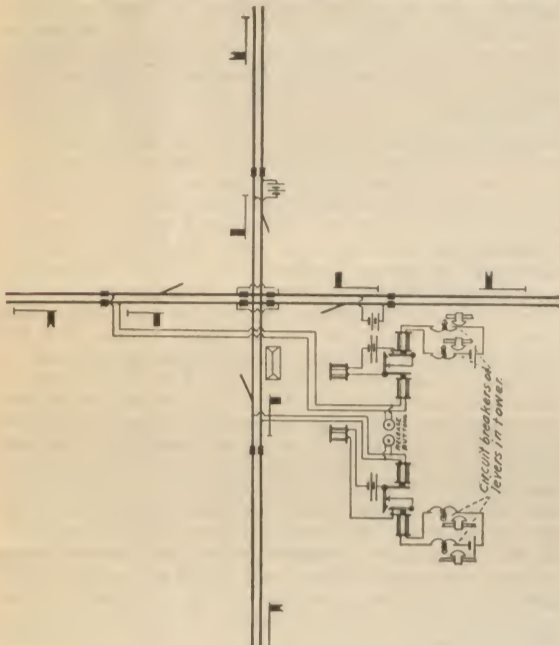


FIG. 7.

are required to try their levers from time to time, during bad weather, to see if they are in working order, and the signal lamps lighted. This, of course, resulted in locking up the machines electrically, and the attachment became a positive nuisance. Cases were reported where trains had fouled at crossings where the electric locking should have prevented such occurrences, and inspectors discovered that the levermen had secretly rigged circuits so that the electric locks were cut out entirely. This led to the introduction of "release buttons," which allowed the operators to try their signals and then release the electric latches. The convenient proximity of the buttons detracted from the usefulness of the electric locking as levermen could release the locks at any time and through carelessness or design, cause serious harm by reversing a route after giving it to a train. The releasing buttons were then put down stairs, or at a remote distance from the operating floor, but the crafty leverman soon found means for short-circuiting at a convenient point and several instances were discovered where "jump wires" had been put in and cleverly concealed leading to some convenient point on the operating floor. This threw all precautions that had been taken to prevent unlocking at will quite out of countenance. Expensive and complicated "time-movements" and various apparatus for checking the levermen and recording the times that they manipulated the electric locking were devised and put in service, which only resulted in complicating matters.

In those days, interlocking was looked on by the average railroad employe as a downright imposition, and it was practically impossible to have proper attention given to the tracks to maintain them in order so that insulations, bond wires, etc., could be kept in proper form to insure keeping the track circuit in working order. The greatest sort of trouble resulted with the electric locking, as, by failure of the track circuit, the locks would drop and the apparatus be locked up indefinitely, or until they were broken into and released by "plugging." The maintenance of batteries was put in the hands of telegraph repairmen and received care and attention only when they had run completely down or when these men had time or inclination to attend to them.

The electric locking of levers has always been a feature of the electro-pneumatic interlocking apparatus, where it has been put to a more extended use, being made to do the service of detector bars. The levers for operating switches and their locks are thus secured during the passage or presence of trains on the track of the route cleared. The circuits for the purpose, as shown in Fig. 8, are changed

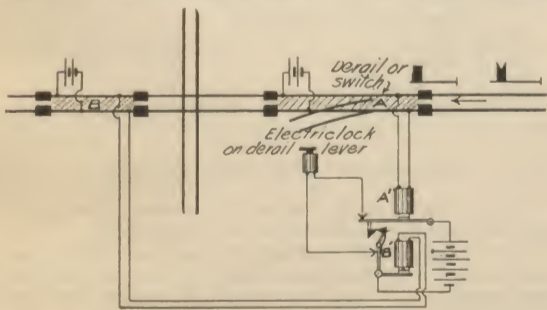


FIG. 8.

somewhat from those shown in Figs. 6 and 7. A short section of track is insulated as shown at A. The train entering here causes the opening of the circuit on the latches through magnet A<sup>1</sup> of the locking relay which can not again be closed until the rear of the train has gone beyond a similar section B, actuating the other magnet B<sup>1</sup> of the relay. Each switch in the plant is similarly equipped with an insulated section and the action on the electric latch prevents operation of the lever the same as a detector bar would do. This arrangement is known as the "electric detector bar" and has been in service at several plants for years. The expense of maintaining the insulated sections

n tracks acted against this scheme in most cases and mechanical detector bars were applied as being cheaper to maintain.

The safe and practical use of the manual block signaling system is attained only by the electric locking of levers in the normal or danger position by means of the track circuit. Supplemented by the electric slot on the signal, which is itself governed by track circuit, the manually operated block signal is practically a perfect system for the safe spacing and blocking of trains, under absolute blocking rules. Such a system has been in service on a number of eastern trunk lines for many years.

Up to November, 1885, there were 3,165 working levers in use in 227 plants divided among thirty-five different railroads in this country. Seventy of these plants had electrically locked levers. Since, then, aside from the pneumatic plants installed, there have been few instances (not over a dozen) where electric locking of levers was applied. There is no doubt that the lack of proper care in the maintenance of the electric apparatus and the consequent failures in the locking was the direct cause of its general abandonment. We were then many years in advance of the times, and it is only now, since the "Signal Engineer" has been recognized, and railroad managers are realizing the importance of his department as a distinct branch in the operation of a system, that intelligent maintenance of the interlocking and signaling plants and strict discipline of levermen have made it practically possible to lock electrically.

To conclude, it will be seen that electric locking was actually applied in practical form before the introduction in this country of the interlocking machines; that it became a feature of the earliest installations of these machines and continued so, under more or less adverse circumstances, for a number of years, falling generally into disfavor for evident reasons until at last conditions have arisen that make it desirable and practical to resume its use, thus placing interlocking on the highest plane of efficiency and insuring more effectively the safety of railway transportation.

#### A NOTABLE ORE DOCK.

The accompanying illustration shows a view of the new ore dock No. 2, of the Duluth, Missabe & Northern Railway at Duluth, Minn. The old dock No. 1 is shown at the right in which only the ore chutes can be seen. In the background the high trestle approach to the docks from the railway may be seen. The new dock is 1,152 ft. long, 52 ft. wide



NEW ORE DOCK AT DULUTH-DULUTH MISSABE &amp; NORTHERN RAILWAY.

and 57 ft. 8½ in. high above water. There are 192 pockets with a capacity of 180 tons of ore per pocket making in all a capacity of 34,560 tons. The illustration was taken before the completion of the work and shows the method of construction and framing of the structure.

#### REPORTS AT THE MEETING OF THE INTERNATIONAL ASSOCIATION OF CAR ACCOUNTS.

The subjoined reports will be presented at the coming meeting of the above named association:

##### CAR SERVICE.

Your committee on car service respectfully reports that it held a meeting at Cleveland, June 22, and another at New York, Dec. 28, 1895, at which several subjects were considered and the following report developed:

Having been informed that certain alleged refrigerator cars, from which the ice boxes have been removed, are being used in the general interchange for the transportation of package freight, green hides and other low class freight, your committee recommends that this association request the owners of such cars to classify them as ordinary box cars in their equipment lists printed in the Official Railway Equipment Guide; and that their service be paid for at the rate of 6-10 instead of 1 per cent per mile.

The recent dissolution of one or two of the demurrage associations in the territory south of the Ohio and east of the Mississippi rivers is an event of which this committee has heard with deep regret. The good results accomplished by the several demurrage bureaus at local and competitive points and trade centers throughout the country,

have been so clearly apparent that your committee feels warranted in strongly recommending the extension of demurrage rules to all territory where they are not now in effect.

##### THE NUMBERING OF ALL CARS IN UNIFORM SERIES.

The subject specifically referred to your committee by the San Francisco convention was the paper by J. W. Burnham upon the subject of "Numbering Cars." Your committee understands that the scope of Mr. Burnham's suggestions is not local, but is intended to comprehend the re-numbering of all cars belonging to all railroads and private companies, placing all cars of each class in one series, distinguishing the several classes and indicating the capacity by a prefix to the numbers. After carefully considering the subject, as outlined by Mr. Burnham, the conclusion of your committee is that the re-numbering of all the freight cars of the country in uniform series is rather an Utopian scheme, and will never be accomplished, no matter how strong theoretically the arguments in its favor may be. Your committee believes that each car owner will insist upon numbering its cars in its own way as is now the common practice. Nevertheless, there are good reasons why Mr. Burnham's suggestions could be applied individually with great profit by several roads whose equipment lists are extremely disorderly.

##### SHOULD THE LINE MARKS ON FREIGHT CARS BE ELIMINATED?

Kindred to, but of somewhat different nature from, the subject of "Numbering of Cars" is the question of "Eliminating the Line Marks on Freight Cars," which has heretofore been discussed by this association. When several railroads assign to the service of one or more fast freight lines a certain portion of their equipment, it is done with the idea of insuring a full supply of cars for the prompt movement of freight. It seems, however, that the very arrangement made to insure a full car supply operates just the reverse, and is followed by other evils not originally desired or intended.

Among the principal reasons why the assignment and marking of cars for the exclusive service of one fast freight line is objectionable are the following:

1. From the standpoint of car supply it restricts their availability for the general business of the country, as there is only one route by which a line car can properly be sent home. The requirement that cars bearing certain line marks must be selected for loading via a particular route makes it necessary to do a great deal of switching to obtain the proper cars, and often results in a great amount of unprofitable empty haulage to get them to the point of loading.

2. On a road originating a large amount of traffic

- tributary to two or more fast freight lines, it is customary for the representatives of one line to order and hold an ample supply of cars bearing the marks of its line to cover anticipated shipments. As the privilege of marking cars for anticipated shipments cannot be exercised for the exclusive advantage of any one line, it frequently occurs that several lines bring empty cars into a certain territory for the purpose of securing the same business, thus causing serious delay to a large number of cars for which no loading is in prospect. Line cars frequently stand idle because they are not available for use by more than one route, while there is an active demand for cars to be loaded by other routes.

3. It is evident that any restrictions upon car movement that will cause unnecessary switching and serious delay will also reduce the average daily performance of cars, thereby requiring a greater number to handle a given tonnage. The more restrictions of any kind that are put upon cars the less service they can be made to yield, because of the greater resistance they offer to the prompt handling of traffic.

In the opinion of the committee it is exceedingly desirable that the line marks on freight cars be eliminated for the following reasons:

1. The cars would become more available for general loading. When a large number of cars had been brought into a certain territory for anticipated shipments they could be applied on the orders of any line, and loaded home by any route.

2. Switching service would be curtailed, the proportion of empty haulage would be reduced, and delays to cars would be considerably shortened.

3. The average daily performance of cars would be increased. The business of all the lines would be handled

in common cars with greater facility and with a fewer number of cars.

#### THE PER DIEM SYSTEM.

Without advancing further argument in favor of the adoption of the per diem plan, your committee desires to make a plain statement of the existing conditions. The difficulties that have been encountered seem to refer not especially to the principle, but, to the rate to be adopted. This association for many years has been consistent in its earnest advocacy of the principle of payment for car service by the day, instead of by the mile run. The American Railway Association and other bodies of railway officials, by their frequent endorsement of the per diem principle, have committed the railroads of this country to its adoption sooner or later. Notwithstanding the prevailing sentiment in its favor, it appears that the interests at stake are so diverse that it may be doubtful, as shown by recent events, whether the interested parties will be able to agree upon one rate for all classes of cars.

The parties directly interested may be divided into three large groups, namely, (1) the private car lines; (2) the belt line or switching roads; (3) and the railroad companies. A broader, and perhaps a more accurate division of the interested parties separates them into two large groups, namely, (1) the car borrowers, or those that are habitually debtors in the car service account; (2) and the car lenders, or those who are habitually creditors in the car service account. Theoretically, the debtor and the creditor companies are diametrically opposed to one another in their respective interests. The former desire to pay as little as possible for their borrowed cars and the latter desire to secure the best possible returns from their rented cars. The adoption of the per diem principle will bring about a readjustment of car service balances and make a new alignment of the interests involved.

Some of those companies that expect to be the losers naturally hesitate to adopt the proposed plan, while those that expect to be the gainers are all ready to inaugurate it. It does not follow that the present debtor companies will in all cases be the losers, or that the present creditor companies will in all cases be the gainers, in the car service account, by the adoption of the per diem principle. Under any rate that may be adopted some companies in either group will gain and some will suffer a loss. Many of those that will probably sustain a loss in the car service account expect to be recompensed by a substantial gain in other directions.

To fix an equitable per diem rate it would manifestly be absurd to consider the probable losses of one group or the probable gains of another. Expediency may dictate that the change from present conditions, when made, be adjusted so as to disturb the conflicting interests as little as possible. It may be expedient for the hungry horse not to disturb the dog wrongfully occupying its well filled manger, but as long as these conditions exist the equity of the case remains unsettled. If the per diem principle is the correct and equitable one, then the rate of rental should be determined upon the basis of those factors which experience has taught us constitute the average daily expense of cars to their owners; and to such a proposition both the debtor and the creditor companies should give a ready assent. Some companies are now paying too much and some are paying too little for their rented cars. Renting cars below cost is an injustice to their owners, and renting them for much more than cost is an injustice to the borrower. The elementary principle which ought to govern is that the rate of rental should closely approximate the expense of ownership. Such a basis of car rental appears to meet all the just demands of the various interests involved; and it is the only basis upon which a permanent solution can be attained under the mileage or the per diem plan.

It is evident, without giving any figures in support of the assertion, that the expense of ownership of a refrigerator car costing \$900 is greater than that of a common box car costing \$500, or an ordinary flat or coal car costing \$350. When we come to consider the fact that the equipment of some companies is almost exclusively of box cars, of others almost exclusively of coal and flat cars, and of others (such as the private lines), almost exclusively of patent refrigerator, tank, and stock cars, we clearly discern the reason why a single rate of rental is unsatisfactory to all the interested parties. The items which constitute the actual expense of ownership are not a matter of theory; they are a matter of record with every car owner. Your committee regrets that it has been unable with the limited time at its disposal to obtain any figures from the several car owning companies to show the actual average expense of ownership. If the companies represented in this association will agree to furnish such information, your committee suggests that the consideration of this branch of the subject be extended over another year.

#### WATCHING FREIGHT MOVEMENT.

Notwithstanding the refinement of modern methods devised by car service officers for watching and expediting the movements of loaded cars, there is still much room for improvement. Your committee believes as the result of its observation and experience, that with few exceptions almost half of the time consumed in the movement of long distant traffic (as between Boston and Chicago or St. Louis,) is lost by standing still in the division and terminal yards of the several roads. On ordinary freight (exclusive of live stock and perishable commodities), the time usually consumed in going 1,000 miles is about five days or 120 hours. The running time of slow trains between terminals will average about 15 miles per hour showing that the time actually in motion does not exceed 66 hours or two and three-fourth days. The movement of an occasional train of live stock, perishable freight, or high class merchandise, over the same distance, within three

days or 72 hours, without exceeding an average speed of 20 miles an hour between terminals, indicates that the careful painstaking supervision given to the handling of such freight has reduced the division and terminal yard detentions to a comparatively low figure. This result fairly suggests the reflection that great improvement is possible by an extension of present methods of watching freight movement to other freight than live stock and perishable commodities. In calling attention to the matter your committee desires to emphasize the fact that the growing public demand for quicker time on all classes of freight may be met by a reduction of the existing serious delays in division and terminal yards.

#### CAR SEALS.

A seal on a car door cannot atone for a deficiency in the construction of the door, its hangings or fastenings. A seal is in no sense of the word a lock or fastening for the door. Its office is not to secure the car against the possibility of unauthorized entrance. Its real purpose is to act as a detective, to establish a record of the time and place of each opening and closing of the door, to locate the responsibility for any loss, damage, pilfering of the contents of the loaded car between point of shipment and destination. If the door, with its hangings and fastening, is properly constructed a good seal will do all that is claimed for or expected of it.

Stated in its simpler form, the proper definition of the real purpose of a car seal is to afford a record. Therefore, the full benefit of a good seal cannot be enjoyed unless a complete continuous and permanent seal record be kept in some central office, based upon daily reports from agents, yard masters and conductors. When there is a claim for loss, damage or pilfering, each one of these employees, through whose hands the property has passed, becomes at once a party in interest to the adjustment of the claim, and there should be no opportunity for evading shifting the responsibility from one to another. The practice of obtaining the seal record of a particular car from the employees through whose hands it has passed, after they have become interested as parties to the claim, is open to serious objection because it often results in an attempt to shift the responsibility. The first essential requisite for definitely locating the responsibility where it rightfully belongs is that the record of seals shall be furnished to the central office with the record of the car movement, and before any claim is made. Inquiry has satisfied your committee that there only a few roads that make any attempt to keep a seal record other than that kept indifferently and spasmodically by the several agents, yardmasters and conductors. Their records are not subject to any check or supervision, are often not continuous, and valuable time is lost in the attempt to make them available when wanted.

Your committee therefore suggests that this association recommend to its members the keeping in the car record office of each road a complete, continuous and permanent seal record, the details of which should be developed by the Committee on Office Methods and Accounting.

Respectfully submitted,

W. W. WHEATLY,	O. W. STAGER,
W. H. ROSEVEAR,	T. F. BRENNAN,
J. J. HALL,	C. G. JAQUA,
T. M. MAGIFF,	The Committee on Car Service.

NOTE—Mr. Brennan desires it to be stated that he does not fully concur in the last paragraph of the report relating to the per diem system. He will submit his views to the convention during the discussion.

#### OFFICE METHODS AND ACCOUNTING.

Your Committee on Office Methods and Accounting held two meetings during the past year, one at Chicago in September and the other at St. Louis in March. Having carefully reconsidered the report of the previous committee and examined further into the subject of a standard of forms to be recommended to this association, we beg to report as follows:

The members, doubtless, understand that this is a new committee, and just what it may hope to accomplish would seem to be as yet problematical, as no action was taken last session upon the first and only report made by the committee. We would suggest, therefore, that the association, at this meeting, consider the forms submitted by the previous committee, and thus afford succeeding committees some evidence of what its views and wishes may be upon this subject. The present committee, with this suggestion for a discussion of the subject in mind, has concluded to make its report in the shape of a paper on Office Methods and Accounting in General and "Standard" Forms in Particular, believing it to be necessary, if we would make progress, to have as clear an understanding as possible in the beginning as to what purpose and object a "standard" may serve, and what benefit may reasonably be expected to accrue to the association if adopted.

The usually accepted idea of a "standard" would seem to be any form or record that would serve the common good. The inquiry naturally arises: Is such a form possible? The present junction card may illustrate. Examining this form we find many roads and private companies using cards of different ruling and size, notwithstanding they all provide nearly the identical information. Now, as time is of essential importance, why should a clerk find it necessary to stop and turn a card over or around, as he does at present? Why should not the railroads, at least, be willing to provide and use a uniform junction card, printed lengthwise or crosswise, whichever is determined preferable, and also why not suggest to private companies the desirableness of having a uniform card for reporting their cars? We mention this more on account of this card being the most extensively used form we have, and to show what lack of system has produced. We think a form which is used so generally should be simplified as much as possible.

The same is true of our tracer blanks, of which there

seems to be about as many different kinds as there are roads, and we ask again what can be the possible objection to a "standard" car tracer or tracers, so that when one is received the recipient will know on sight, without reading a lot of printed matter, what information the sender desires. Would it not be for the mutual advantage of the association to adopt a "standard" of three different tracers, the color of each form denoting its purpose, for instance, the so-called blanket tracer, or tracer asking concerning disposition or present location of a number of cars, to be printed on white, manilla or buff-colored paper, a "follow the car" tracer on blue, and the tracer for a car away from the home line 90 days on red, which, by the way, would seem to be an appropriate color, that of danger, conveying to the road having the car and holding it for that indefinite home loading, that there was danger to their reputation, at least, in further delay. If this scheme finds favor, it might be well to have it understand that a road using either of the tracers for any purpose other than that intended would have such tracer consigned to the tender mercies of the waste paper basket by the road receiving it. Some precaution of this kind would seem to be necessary to prevent abuse of the respective tracers. Next there are what may be termed correction cards or blanks, that is, a printed series of questions to be sent conductors, agents, superintendents and others on local or home roads, and it might prove desirable to provide separate forms for seeking information from foreign roads concerning non-report of mileage, missing car movements, etc. We find a dozen or more of these blank or card forms in use by some roads when one, or at most two, would seem, in our opinion, to answer the same purpose to even better advantage; for instance, one form, the card form being preferable, covering all the questions of a local or home road character, and the other requesting general information from foreign roads.

When we come to the consideration of such general forms as are used by roads for the agents and conductors' reports, and in the office, books for recording cars, we realize that there will be much difficulty in securing the adoption of an association "standard," for it appears a self-evident fact that no form can be produced that will meet the necessities of all car accountants, and at the same time fulfil the requirements of the superintendents of transportation, which will be suitable alike for the transcontinental or trunk line and for the road of a hundred miles or so, and corresponding business. Notwithstanding this manifest difficulty, your committee is of the earnest opinion that it is possible to secure and adopt what may be termed or called a "standard" of all these general forms, and such "standard" will, in our opinion, result to the lasting benefit of the association, as a body.

It will first be necessary, however, to comprehend our idea fully. There seems to your committee to be two ways of arriving at such "standard" of these general forms, i. e., the simple or complex. In our examination of the miscellaneous records, etc., we perceive, or think we do, in all the forms or records of the same kind, what may be termed the fundamentals or essentials in each respective kind of the same form. Take, for instance, the conductors' wheel or car report. We all know it is necessary to rule a blank to provide for, at least, the following information: The train number or direction of extra, the leaving and arriving station, date, time leaving and arriving, engine number, name of conductor and engineer, car initial and number, and loaded or empty. All of this information would seem to be imperative, and is what we mean by fundamental or essential information to be found in all conductors' car reports.

Now, would it be preferable to adopt such a "standard," with the idea that it should be for the purpose only of affording a basis or foundation upon which may be constructed a form as elaborate in detail of information as taste or necessity may dictate, or would you, as an association, prefer as "standard" what in a word may be termed an "up to date, an ideal form or record? Your committee would favor the forms most complete and replete in every particular to which the association as a body could point with pride, and to which the individual members could turn, feeling it to be a never ending source of information, for it should be understood that such a "standard" implies that it will always receive the best efforts of succeeding committees on office methods and accounting, and the continued co-operation of each member to make and keep it in fact and in truth "up to date."

Respectfully submitted,

T. R. BOARD,	T. R. LIMER,
R. H. WEDDLE,	W. F. RUPP,
W. H. SHELTON,	W. B. DREW,
J. J. MERRILL, chairman.	

#### SUBJECTS FOR DISCUSSION.

The Committee on Discussion submits the following report of topics for consideration at the meeting:

It is the opinion of the committee that the policy usually pursued by its predecessors is the only way productive of good results; i. e., the presenting of subjects for discussion, and the securing of papers from members on subjects supplied by, as well as read by, the authors and discussed on the floor of the convention.

Papers have been promised on the following subjects:

- "Laws of Copyright on Railroad Blanks."—S. H. Church, Penna. Co.
- "Reminiscences of the Past."—C. W. Cushman, Ry. Car Assn.
- "Work of the Treasurer, Past and Present."—J. W. Burnham, Fitchburg R. R.
- "Light Weighing and Stenciling Freight Cars."—T. S. Bell, Pennsylvania R. R.
- "Our Association, Past, Present and Future."—J. R. Cavanagh, C., C. & St. R. Ry.

"Matters in General."—A. B. Wilmer, Mobile & Ohio Railroad.

"Distribution and Handling of Foreign Equipment."—W. E. Beecham, C. M. & St. P. Ry.

The following topics for discussion have also been suggested:

"The advisability of a universal system of numbering railroads for recording interchange movement of cars on foreign lines, and showing number of delivering line on Junction card."

"The relation of small roads or feeders to trunk or through lines."

Respectfully submitted,

A. F. CURRIER,  
F. E. HIGBIE,  
W. R. BRADLEY,  
CLINTON BROOKE,  
R. H. SPENCER,  
Committee on Discussion.

#### A GASOLINE VELOCIPEDE INSPECTION CAR.

The Sheffield Car Co., of Three Rivers, Mich., has recently perfected a gasoline inspection car for use on railroads, which has a number of valuable and interesting features and is worthy of special attention from roadmasters, superintendents and others who have occasion to use velocipedes, or hand cars for inspecting portions of the road under their charge. This car is compact and convenient to an unusual degree. The appearance and size of the car is similar to that of the ordinary three-wheeled velocipede. It carries two persons, and the only change in the construction from that of the ordinary velocipede by these manufacturers, is in the extension of the top rails of the frame throughout the length of the car, and also the bar carrying the third wheel is reinforced by iron bands similar to those used in the cars employed for telegraph repair work. The motor is operated by gasoline vapor mixed with air in a vertical carburetor into which gasoline drips from a circular tank carried upon the plank of the car on which the seats are arranged. Air is drawn through the carburetor into the cylinders by the pistons of the engine. There are two cylinders, one upon each side provided with trunk pistons two and three-quarter inches in diameter having a five and one-half inch stroke. From these pistons connecting rods run to 180 deg. cranks upon the rear wheel of the car.

The igniting mechanism consists of a battery, of chloride of silver cells carried in a box under the seat board, and a spark coil located just behind the box. The sparking attachment takes its motion from the valve motion which is driven by an eccentric on the rear axle. The valve motion is very ingeniously arranged. The eccentric drives a rod which operates a shaft with intermittent motion by means of a ratchet. This shaft carries at its ends a pair of ratchet wheels on each side of the car. One of these wheels on each side controls the exhaust valve and the other makes the spark. The car weighs complete 240 pounds and its speed is 25 miles per hour with two men of ordinary weight. The main wheels are 17 inches in diameter. The entire construction is carried out with an apparent view of strength, stiffness and simplicity of every detail. Its speed can be regulated easily and nicely. There are but two motions required for starting or stopping, one being to admit the gasoline to the carburetor and the other to complete the electric circuit for the spark by a small switcher. After these two motions are made a slight push starts the car and the tank capacity of 1½ gallons of gasoline is sufficient for a run of about 80 miles. The mechanism is arranged with special reference to accessibility and ease in making repairs. The car is now in Chicago and a representative of the RAILWAY REVIEW enjoyed a ride upon it this week through the courtesy of Mr. W. C. Squire, who has it in charge. The wearing parts of the valve motion are of case hardened steel and it is so designed as to acquire no adjustment except as to the sparking attachment which may very easily be compensated for wear if it is found necessary.

#### Compensation for Car Service.

At the meeting of the American Railway Association, held in Cincinnati last month, the committee on car service reported that session in New York City, on March 13, 1896, the question of the proper rate to be charged for postal cars had been brought to its attention, with the suggestion that the difference in the value of the several classes of cars in the mail service made it unfair to charge the same rate for all such classes. For instance, postal cars used as distributing railway post offices should not be classed with cars used for the transportation of mail in bulk.

The committee recommended that the resolution respecting uniform rates per mile, adopted October 16, 1895, be amended as follows:

"Resolved, That the uniform rates per mile for passenger equipment be as follows:

"For coaches, chair cars, combination passenger cars, or postal cars, \*3 cents; for baggage and express cars, combination baggage, express and mail cars, or mail storage cars, 1½ cents. These rates are to apply where the owners of the cars participate in the business, and not where cars are hired to other lines."

Also that the resolution respecting the per diem rate for passenger equipment hired at other than mileage rates, adopted October 16, 1895, be amended as follows:

"Resolved, That the association recommends that the per diem for coaches, chair cars, combination passenger cars, or postal cars,\* hired at other than mileage rates, be fixed at \$5 a day, and for baggage, and express cars, combination baggage express and mail cars, or mail storage cars, at \$3 per day, subject, however, to agreement between the parties interested."

"It is understood that the train trackage and other rates hereinbefore provided and recommended for use only between roads mutually agreeing to exchange service on the basis aforesaid."

The attention of the committee had been called also to the fact that in various parts of the country different practices exist in regard to the maximum excess allowed over the marked capacity of freight cars, and it offered the following resolutions:

"Resolved, That the American Railway Association desires to call the attention of the various traffic associations to the following recommendation, which it adopted October 16, 1895.

"That the maximum excess allowed over the marked capacity of freight cars shall not exceed 10 per cent of such marked capacity."

"Resolved, That with a view of bringing about uniform practice throughout the country in this respect, the secretary be instructed to send a copy of this recommendation and resolution to the manager of each of the several traffic associations."

\*Postal cars include cars used exclusively in the mail service and as railway post offices.

#### IMPROVEMENTS IN THE NATIONAL INTERLOCKING MACHINE.

The model of 1896 of the interlocking machine manufactured by the National Switch & Signal Co. of Easton, Pa., embodies a number of improvements in design and construction which, through the courtesy of Mr. Charles Hansel, vice president and general manager of the company, we are enabled to illustrate and describe. The accompanying illustrations are taken from photographs of different portions of the machine which is being furnished by this company for the interlocking plant at Hartford, Conn., upon the New York, New Haven & Hartford Railroad. The plant itself, which was designed by Mr. A. H. Rudd of that road, will be described in a future issue. The changes in the machine render it much stronger and more rigid, qualifying it better

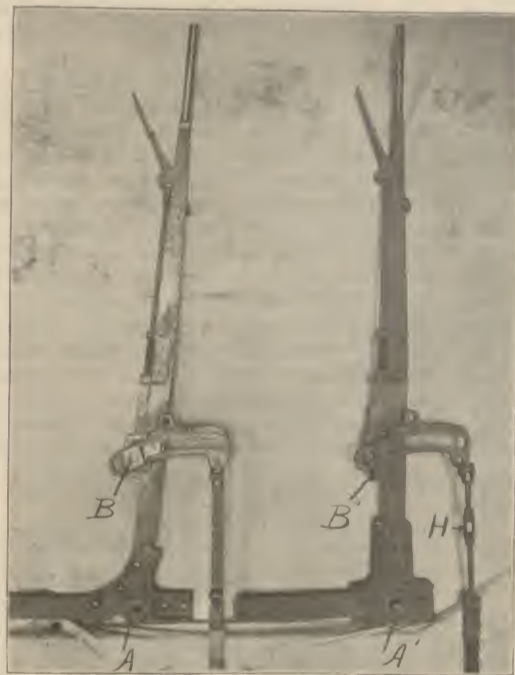


FIG. 1.—IMPROVEMENTS IN LEVERS.

than the old model to withstand the heavy work incident to the use of rail of 100 lb. section, which is used upon the N. Y. N. H. & H. R. R. The actual increase in the weight of the machine frame is about 33 per cent, and while it may not have been necessary from the standpoint of strength required, the result is noticeable in the appearance of the machine which must satisfy any who desire to see heavier construction.

In Fig. 1, one of the standard form of levers is shown at the left and one of the new model at the right. There are three changes in this part of the

construction beside the alteration in the arrangement of the lever tail. The shape of the latch dog shown at B in the standard machine has been changed as shown at B1 in the new construction, in such a manner as to give support to the outer end of the pin. The old form consisted of a stud supported at one end only and carrying a washer upon its outer end as shown. A second improvement in the lever consisted in increasing the size of the lever shoe pin to 1½ in. in diameter, shown at A and A1 in Fig. 1. The tappet connection is provided with a turnbuckle



FIG. 2.—LEVER STOPS.

for adjustment, which is held in position after adjustment by turning up a small set screw in the upper part of the turnbuckle. A side view of the machine is shown in Fig. 2, in which the lever stops upon the top plate castings are shown. These stops are heavy and bring the levers to a fixed point which should assist materially in keeping them in line. The stops are marked C in this illustration.

Fig. 3 shows two important improvements, one of which consists in the milling of the surfaces shown at E, which formerly were made without a close machine fit. Now both the lever shoe and bridge are milled to accurate gages. An improvement in the

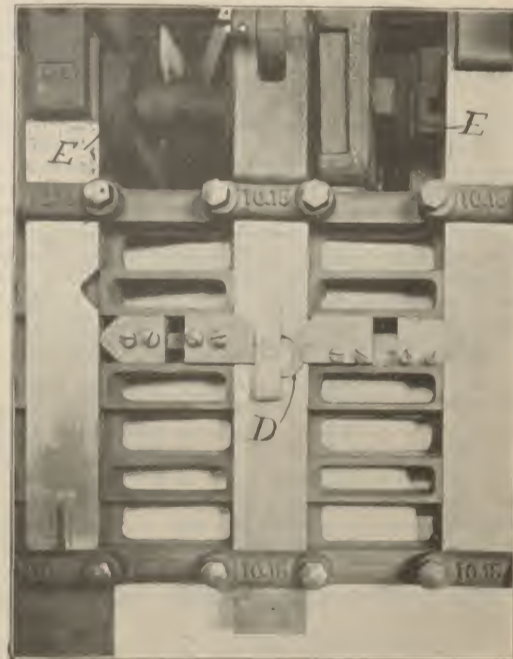


FIG. 3.—VIEW OF LOCKING.

locking is shown at D in this illustration in the form of a non-wearing special lock. It will be remembered that the older form of special lock made use of a circular disc of steel, and this has given place to the slide shown, which has flat instead of curved bearing surfaces to come in contact with the locking dogs. The inside of this special lock is cut away in

the form of a circular hole into which a short pin from the lock cage projects to prevent the special from dropping out, and this hole is sufficiently large to admit of the necessary motion to the special, without coming in contact with the pin. These changes have not in any case been made because of faults developing with the standard machine, but they have been introduced in the effort to improve the construction in every possible way.

#### SOUTHERN PINE—MECHANICAL AND PHYSICAL PROPERTIES.

A circular has just been received from the division of forestry of the U. S. Department of Agriculture which gives the results of the timber investigations carried on by the division of forestry in the laboratory at St. Louis under Prof. J. B. Johnson, and in the laboratory at Washington, by Mr. Filibert Roth, in condensed form in advance of a fuller account in order to make the information more speedily available. The data contained in this circular are condensed from not less than 20,000 tests, and a similarly large number of measurements and weighings, fuller details of which will appear in a special bulletin. From the statements presented the following have been selected with regard to the strength of large beams and columns.

Owing to the fact that much wood testing has been done on small select and perfectly seasoned pieces usually from butt logs, the values thus obtained seemed to differ very markedly from the results on large timbers usually very imperfectly seasoned, and it was claimed that tests on small sizes always furnished too high values, just as if the differences were due to sizes alone.

While, to be sure, a small piece may be so selected that defects are excluded, the grain straight and in the most favorable position with regard to the load, the assumption of the difference in strength of small pieces from that of large sized sticks has never been made good experimentally.

Since it appears desirable to compare the results from large beams and columns not only with the average data obtained from the general test series on small 4 x 4 material, but also with the average strength of small pieces cut from the same beams and columns, a special inquiry into the legitimacy of such a comparison was made. This study involved over 100 separate tests and proved the very important fact, that uninjured parts of broken beams and columns do not suffer in the test. The large sized beams varied from 4 x 4 to 8 x 16 in.

From the accompanying table it would appear that large timbers, when symmetrically cut (i. e., with the center of the log as center of the beam) develop as beams as practically the same strength as the average of the small pieces, that may be cut from them and sometimes even higher values; the explanation being that cut in this manner the extreme fibers which are tested in a beam, come to lie in that part of the tree which, as a rule, contains the strongest timber.

Results discordant from these may be explained by differences in the degree of seasoning of the outer layers and also by the fact that especially in the northern pineries timbers are often cut from the top logs which are weaker and more defective.

The square columns were mostly 8 x 8 in., some 10 x 10 in., a few of larger and also some of smaller dimensions. The ratio of length to width varied from 12 to 27, about one-half being under and the other half over 18 to 1. The compression pieces of the regular series, and those cut from the broken columns, were in general about 4 x 4 x 6 in.

It will appear from this statement of average results that columns develop only from 62 per cent (in Cuban) to 78 per cent (long leaf) of the compression strength of ordinary short pieces. The explanation may be due to several reasons, natural and mechanical. In a column, unlike a beam, all the fibers are under great strain, hence all the defects, which are by necessity found in every column, influence the results; the flexure of a column under strain is an element of weakness, to which the short compression piece is not subject. In addition the difficulty of

Tests of Large and Small Beams—Bending Strength.

No. of tests inv'd	Small beams, general test series.	Large beams.		
		Total.	Beams from which small beams were cut.	Small beams cut from large beams.
	Lbs. per sq. in.	Lbs. per sq. in.	Lbs. per sq. in.	Lbs. per sq. in.
Long leaf.....	11,300	11,500	9,800	10,100
Loblolly.....	10,000	10,800	10,300	10,000
Shortleaf.....	9,300	9,200	8,700	8,700

Selected Tests of Columns and Compression Pieces from the same Trees Compared.

No. of tree.	Length.	Ratio. 1/d	Small pieces. Average of whole tree. (a)	Large columns (b)	Relative Value.		Deflection. Inch.	Failure.
					(a)	(b)		
	Feet.		Lbs. per sq. in.	Lbs. per sq. in.				
239	12	14	6,700	6,100	100	91	0.7	Sheared
240	12	14	7,000	6,900	100	99	0.1	Compress'n
241	12	15	6,900	6,500	100	94	0.7	"
309	12	12	6,800	6,500	100	96	0.4	"
312	12	16	6,100	6,300	100	103	0.4	"

determining the average moisture condition of the large timber throughout the cross section and that of the small pieces cut from them afterward would render this method for columns less satisfactory; a larger number of tests will still be required to establish comparable average conditions in the two kinds of tests. It would, therefore, be unsafe to generalize too hastily from these average figures at least as to the numerical difference, for there are remarkable individual exceptions. Not only do individual columns show differences in strength 50 per cent and more lower than the compression pieces from the same log, but sometimes they show practically the same or even a higher value of strength, as will appear from the following selected cases, in which the data for the columns are placed in comparison with these obtained on compression pieces from the same tree:

In these columns (nearly one-tenth of all long leaf pine columns tested) the strength was so nearly the same as that of the short pieces, that it appears as if flexure had but little to do with the failure, the small differences being amply accounted for by a larger number of defects in the columns. Should this prove true in general for wooden columns, as ordinarily designed, the problem would become simply a study of the influence of defects and of proper inspection.

The nature of the failures would also point in this direction:

Of 86 columns 32 failed normally, i. e., in simple compression; 22 were crushed near the end; 14 failed at knots, and 19 by shearing, the rupture usually beginning at or near the ends; a small knot proved sufficient to cause a large column, 20 times as long as its diameter, to fail at 14 in. from the end.

The deflection in the average for all columns (12 to 20 ft. long) was only about one inch for the maximum load, when to be sure, destruction had progressed for some time; at the elastic limit the deflection was only about one-half as much. These results would seem to warrant the statement that for pine columns at least, in which the ratio of height to least diameter does not exceed 1 in 20, none of the accepted column formulae are applicable, the nature of the failure being mostly in simple compression, and depending more on specific defects than on the design of the column.

B. E. FERNOW,  
Chief Division of Forestry.

#### NEPOTISM IN THE RAILROAD SERVICE.

To the Editor of the Railway Review:

I want to say a word in regard to the clerical departments of railroads, and the practice of advancing clerks who are related to railroad officials, because they are so related, but who have not the merit entitling them to such advancement.

It is too often the case that the poor clerks whose merit is plainly the means of promoting the officers into positions above those which they previously occupied, are kept down because they are not related by blood or consanguinity to their employers. Such injustice is, and has been practiced for years on many of the railroads in this city, and many of the officers to-day owe their promotion to their present positions to the hard work of some poor devil whom they would be glad to keep down even now if they could.

But the favorites of the officers—those who are related to them—are advanced in salary and position in preference to a clerk whose sole hope is that his merit, and the undivided attention he gives to his employers interest, will win for him some consideration. Alas! he is doomed to disappointment, be he ever so talented or bright, he has no prospects unless he is a blood relation. I speak from experience, as I was once connected with several railroads in this and other cities, and all the officers had their favorite blood relation, and I must say for truth's sake they generally turned out poorly, to the shame of their blood related employer, who showed his shortsightedness in employing them.

I worked hard and faithfully only to see wives' brothers-in-law, cousins, sisters' husbands, etc., etc.,

Tests of Large and Small Columns—Compression Strength.

No. of tests involved..	Regular series from same trees as the columns.	Columns (simple compression).	Small pieces cut from columns.
	Lbs. per sq. in.	Lbs. per sq. in.	Lbs. per sq. in.
Long leaf..	6,600	5,300	7,100
Loblolly....	6,800	4,700	6,300
Shortleaf....	5,900	4,100	6,200
Cuban.....	7,400	5,000	8,700

advanced ahead of other really meritorious clerks. I believe that the railway service is a business to which every good intelligent citizen may properly aspire, and the public interest plainly demands that admission to it, should not depend upon personal favor, because such favor cannot well be impartial, and because a system of appointment by mere influence, may be readily perverted to the promotion of private interests and personal ambition.

Appointments by influence naturally result in making the holding of office depend not upon efficiency and capability in the discharge of official duty, but upon the assiduous cultivation of the favor of a patron. Such office policy is incompatible with the self-respect of the incumbent, and the business must necessarily suffer from the decline of its morals.

It would afford me much pleasure and amusement to have this matter discussed, commented upon and denied by those who feel that the truth has struck home, for you well realise I presume that the truth is never relished, and that we can always tell when the coat fits by their finding fault with it.

Yours for justice,

S. E. BROADHURST.

Chicago, Ill., May 11, 1896.

#### SERGEANT AIR REHEATER.

The accompanying illustration shows the general appearance of an air reheater manufactured by the Ingersoll-Sergeant Co. The fire, which may be either gas, oil, coal or coke, is in the center, and where coal or coke are used is fed from the top and regulated the same as any self-feeding stove. The air enters at the top of the heater and is forced down through an annular chamber around the fire. This chamber is narrow and the air passes in a thin sheet over the heated surface of the interior shell or



SERGEANT AIR REHEATER.

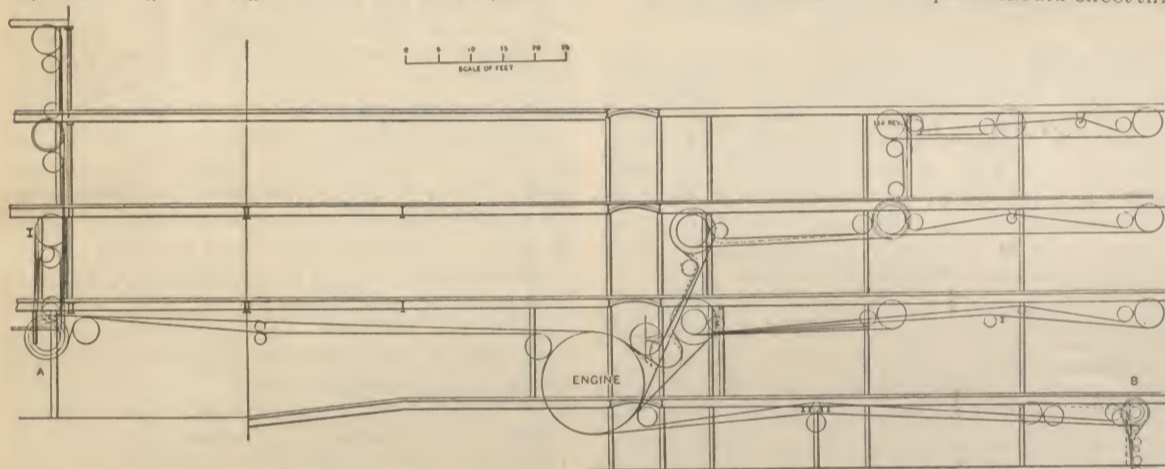
fire-box. The form of the heater allows the air to expand as it becomes heated and it descends without increasing its velocity. The outside surfaces of the heater are covered with non-conducting material and jacketed with sheet iron.

This is a simple form of apparatus consisting of two cast iron shells bolted together and there is nothing to burn out or get out of order. The heater is made in one size only and its extreme dimensions are 42 in. in diameter and 54 in. in height, the grate being 19 in. in diameter. It is stated that tests have shown the heater to be capable of heating 340 cu. ft. of free air per minute at 40 lbs. pressure, to 360 deg. F. and give a gain of 35 per cent in the measured amount of work done by the air when passed through the heater as compared with the same volume of air when used without heating.

One of these heaters will of course heat a smaller volume of air to a higher temperature or a larger volume to a lower temperature, but if more than 400 cubic feet per minute must be heated the best economy may be obtained by using the heaters in series. The heaters are placed as near as possible to the point where the air is used and where air must be carried any distance before using, such a device is essential if the best economy is to be obtained.

#### BELTING POWER TRANSMISSION.

A description and illustration of the interesting application of belting transmission at the new building No. 1 of the Brown & Sharpe Manufacturing Co., of Providence, R. I., has just been received, and the general arrangement of the belting is shown in the accompanying diagram. The installation of this work was made during the last year, and was made necessitated by the newly erected portion of the building at the left of the engine as shown in the drawing. The object in view was to belt as directly as possible from the engine to the centers of power consumption and for this purpose, four crowns were turned upon the face of the main belt wheel of the engine, and from this wheel four independent belts drive the principal jack shafts in various parts of the building. The distance from the center of the main wheel to jack shaft A at the left is 84 ft., the jack shaft B in the basement at the right being 86 ft. distant. It was also desired to run the belts as rapidly as possible within the limits of safety. The belts on the main wheel run at a velocity of about 3,600 feet per minute and with one minor exception, none of the belts run less than 2,500 ft. per minute. It was also important to get as large arcs of contact as possible



POWER TRANSMISSION BY BELTING—BROWN & SHARPE MANUFACTURING COMPANY.

upon the pulleys which was done by means of guide pulleys upon the slack sides of the belts, and in many cases three-quarters of the pulley circumference is thus utilized. In nearly all cases the binder pulleys are movable and may be also used as tighteners.

An advantage is gained through the lightening up of the tension of the belts made possible by the use of these binder pulleys, which is thus explained. "As is well known, the amount of rotative power of a belt over a pulley is the difference between the tension in the tight side and the tension in the slack side, and the difference or ratio increases quite rapidly as the arc of contact is increased. To illustrate, let us assume the transmission of a force of 100 lbs. through a pulley having an arc of contact with its belt of three-eighths the circumference, and another having an arc of contact of three-fourths of the circumference.

"Referring to Cromwell's 'Treatise on Belts and Pulleys,' page 118, we find that for leather belts over leather covered pulleys, the tension in the tight side of the belt is for an arc of contact three-eighths the circumference 1.53 times the power transmitted, and for three-fourths the circumference 1.14 times the power transmitted. This means that for the two cases assumed, the transmission of a force of 100 lbs. with arc of contact three-eighths the circumference, the tension in the tight side of the belt 153 lbs., and in the slack side 53 lbs.; while with the arc of contact increased to three-fourths the circumference, the tension in the tight side is 114 lbs. and in the slack side 14 lbs., the ratios of these tensions being in the one case 2.88 and in the other 8.15.

"It will also be observed that the pressure on the bearings would be reduced from 306 lbs. in the one case to 228 lbs. in the other, say 32 per cent., and the driving capacity of the belt increased, assuming the same maximum tension in each case, by 34 per cent.

"Some prejudice seems to exist against the use of binder pulleys, but when we consider the merely nominal pressure under which they run, the reduced stress on the principal bearings, the increase

efficiency of the belt and their practical convenience as tighteners, their intelligent use appears to be fully justified. It is worthy of mention that these driving and receiving pulleys, with the single exception of the main band wheel, are all covered with leather; also that the belts are double and cut from the hides so as to bring the backbone of the hide in the center of the belt. The belts are about  $\frac{5}{16}$  inch thick.

"Under the conditions of surface and contact described, the belts have been proportioned to their work on the basis of 1 inch in width running 300 ft. per minute per horse power, corresponding to a maximum strain of 125 lbs. per inch of width, or 413 lbs. per square inch of section."

#### GRAPHITE PAINT.

In a paper read before the American Society of Mechanical Engineers last year, Mr. M. P. Wood, in stating the essentials of a good paint for whatever use specifies that it should adhere firmly to the surface over which it is spread and not chip or peel off. It should be non-corrosive to the material protected and must not be subject to chemical changes within itself. Its surface must be hard enough to resist frictional influences and yet elastic in order to conform to temperature changes. It ought to work properly in application, a property depending largely upon the relative amounts of pigment and liquid. It should dry with sufficient rapidity and be durable, which is a property of both the pigment and the liquid. The last requirement is in regard to the covering power by which is meant the power to so cover the surface to which it may be applied that its protection from decay not only is assured but that the minimum amount of paint should effect this

mix with oil readily and thoroughly in such a way as to admit of applying it evenly and without the trouble incident to the settling of paints in which the pigments are heavy. The drying action of this paint is stated to be more like mortar than other forms of paints. The drying of the oil causes it to become elastic somewhat like rubber which binds the particles of the paint together and yet is sufficiently elastic to bend without cracking. This elasticity is an important property especially upon the sea coast where painted structures are liable to a sand blast action due to the blowing about of sand by the wind. As to the covering qualities it is stated that one gallon of the brand designated as "Superior" will cover from 600 to 800 sq. ft. which is stated by the makers to be more than three times the covering power of the same quantity of lead or iron oxide paint.

The following statements are made by Mr. Wood and are published in the transactions of the American Society of Mechanical Engineers Vol. XVI.

The Detroit Graphite Manufacturing Company, the analysis of whose brand of L. S. G. amorphous graphite pigment is given in vol. xv., page 1072, (Trans. A. S. M. E.) present some samples of its application to boiler tubes exposed to the combined action of fire and hot water under pressure which will be of interest to the members, and to which attention is called.

The resistance of these brands of paint to the corrosive action of acids or alkalis is very remarkable, as the following severe tests will show. Pieces of iron painted with them have been dipped in muriatic, sulphuric, and oxalic acids, and then allowed to dry with the acid upon them for 19 days, without showing a trace of any damage to the paint. The longest time which other paints withstood these conditions was 24 hours, and then they were rapidly and entirely destroyed. These paints have been immersed in ammonia and sal-soda for 19 days, in coal oil for several weeks, in strong brine for 6 years, without showing injury. Pieces of iron have been coated with L. S. G. and submitted to 24 hours tests in boiling alcohol, boiling beer, boiling brine, boiling sugar and water, without the paint showing injury. Red lead paint exposed to boiling alcohol, stood 15 minutes; in boiling beer 30 minutes; in boiling brine 25 minutes; in boiling sugar and water 15 minutes. L. S. G. paints immersed in cold soft soap stood 24 hours without injury, while other paints stood for one hour only. All of the above tests are extremely severe conditions, and can hardly arise in practical use, except under exceptional cases.

Smokestacks painted with "superior" graphite paint have been heated to redness without blistering. Sheet tin coated with these paints can be twisted and bent in all directions without scaling or cracking the paint. Some samples of the boiler tubes coated with these paints, and mentioned in a former paper (Transactions A. S. M. E., vol. xv., p. 1,033,) showing the power to resist the formation of scale, have now been in use for over two years and are submitted for inspection. The tube removed, from which the samples were taken, was covered with a soft deposit of mud (not scale), and could have been washed clean by a current of water from a hose, while the adjoining tubes, not painted, were covered to a great extent with a hard, vitreous scale, over  $\frac{1}{16}$  in. in thickness, that required the use of the scraper or usual pickling process to remove.

The tubes painted had been in use for over a year before being painted, and were more or less pitted and corroded. All this action has ceased, and there appears to be no reason, from the present appearance of the tubes, why they will not be in as good order at the end of five years from date as they are now.

Wooden surfaces coated with it and exposed to heat are said to char without injuring the paint. A common objection against graphite paints is in regard to the color but these paints can be furnished in any shade from the natural dingy or steel gray color to any which may be desired.

In the RAILWAY REVIEW of March 3, 1894 an illustrated description was given of a canvas bag which was painted inside and out with graphite paint and filled with water in the office of the Detroit Graphite Manufacturing Company in July 1892. Since that time the bag has been hanging and though kept full not a drop of water has leaked through. The water has been frozen solid several times and yet the paint is apparently as good as ever and the canvas is pliable and soft. This is the most convincing demonstration of water proof qualities and the permanence of the paint. Experiments of coating boiler tubes were first made upon stationary boilers and equally good results may be expected from their employment upon locomotive boiler tubes. The application of a coat of paint to tubes is a very simple matter and while it may to a very slight extent interfere with the conducting of the heat from the tubes to the water it prevents the great loss due to scale. If five years of service may be obtained with tubes which are coated with this paint this service alone would be an item of importance because of the great difference between the cost of painting and that of renewing tubes.

purpose. The common expression of covering power refers to the amount of surface which a given weight of paint will cover

It is the present purpose to compare the known qualities of graphite paint with the requirements as laid down by Mr. Wood with particular reference to the product of the Detroit Graphite Manufacturing Company of Detroit, Mich., a concern which is well known in connection with this industry. It should be stated that considerable attention has been given by chemists to the chemical action between the ingredients of paint and the metal surface of structures. They have found in the study of white lead paints that there is a chemical action between the lead and the oil which forms a lead soap. It is claimed that by the use of red lead in a pigment, the paint acts as an oxidizer forming a thin coating of oxide upon the metal which it protects from further corrosion. It has also been claimed for oxide of iron paints that similar protection is afforded. From Mr. Wood's statement however, the inference may be fairly taken that a paint which has no chemical action going on within itself or between itself and the material which it protects, would be preferable to any in which the oxidizing or other chemical actions are possible. The class of paint in which chemical action is absent is well represented by the graphite paint of these manufacturers. These paints are manufactured from a natural substance, amorphous graphite, mined in the Lake Superior region of Michigan and they seem to possess remarkable powers of resisting heat, acids, water, alkalies, brine, sea water, sulphur fumes, etc., all of which applies to surfaces coated with it under test conditions and practice have, according to Mr. Wood, been resisted with such satisfactory results as to warrant the guarantee that its use is a sure protection against rust or corrosion of any metallic objects under any circumstances and in any climate.

The cheapness of graphite enables this paint to be sold at a low price. The lightness, fineness and smoothness of the particles of the powder cause it to

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CHICAGO, SATURDAY, MAY 16, 1896.

SOME railroad managements have gone into the consideration of the subject of liberal expenditures for iron and steel for the various construction requirements, and so far as can be learned their conclusions are favorable to cautious and easy contracting for new work. This conclusion, it is understood, is distinctly apart from the matter of financial convenience. The larger iron and steel consumers are showing by their course that they regard easier prices as more probable than higher prices. The evidence of this is seen in the unusual activity displayed in the formation of associations and treaties to restrict production. All these devices are temporary. Just now the steel makers are at a stand still as to the wiser policy. Some are inclined to close and purchase their allotted product elsewhere. Pig iron makers have not relinquished the hope of forming a more effective combination. The bar iron makers know what failure means. Other branches have wearied of the effort. What the next step will be no one knows. The laws of trade, however, are able to teach the most powerful combinations the lesson that has been taught so often before.

THE recent decision of the supreme court of the state of Illinois in the case of the petition of the ticket brokers takes away the last obstacle to the possibility of altogether removing this demoralizing agency from the railroad business. It is by no means certain that this feature of passenger traffic might not have been abolished at any time during the past five years had there been unanimity on the part of the railroads in any given section of the country. It might as well be admitted that the railroads themselves are largely responsible for the existence of the "scalper," and had that fraternity been entirely dependent upon such tickets as it could obtain from the public, the business would not have assumed its present proportions. Now that the question of the illegality of the traffic has been settled, at least so far as Illinois is concerned, there is no reason why the trading of unauthorized persons in railroad transportation should not be abolished. It is not supposed that the scalper has much fear or respect for the law and that he will discontinue his business so long as opportunity offered for its continuance, but with the decision of the Illinois supreme court on the one hand and the decision of the United States supreme court in the Brown case on the other, abundant means is at hand for successful interference. It is true that the decision of the Illinois court is inoperative beyond the boundaries of the state, but the interstate commerce law will answer all purposes. To furnish brokers with tickets *en bloc* or otherwise at less than regularly advertised tariff rates is as much a violation of the law as the paying of rebates on freight shipments; and, now that testimony is compellable, it will not be a difficult matter to get at the source of the supply of the tickets found in the hands of scalpers.

IN line with the favorable view which is generally taken of the Brown system of disciplining railroad employes, it is interesting to note that upon the road where it was first put into effect, the Fall Brook Railway, it has been singularly successful. This might have been expected as a consequence of the operation of the system under the direction of its founder. It is reported that seventy-six per cent of the conductors in freight service upon that road received a premium of sixty dollars each last year on account of their records having been perfectly satisfactory, and whatever may be thought of the plan of rewarding men having such responsibilities with a money premium, it is given evidence in its value when such a large proportion of men are entitled to the reward. It would be interesting to know more about the other twenty-four per cent. It is stated that their short comings were not due to carelessness which resulted in accidents, but chiefly to mistakes in the disposition of cars. This brings out an important recommendation for such a system, in that the small matters relating to the operation of trains may be considered and brought forcibly to the attention of conductors and others, in a way which not only appeals to them in connection with their ambition to stand well but also effects their earnings. It is asked how a small matter such as the wrong disposition of a car is to be handled by what may be termed the old system of discipline. A system involving lay-offs cannot be made to fit such cases and it is only when a man's daily work counts either for good or evil against his record that the little things can occupy the position in the estimation of the men which they deserve.

THE subject of electric locking of the levers of inter-locking plants is now occupying the attention of railway operating officers to a greater extent than at any time during the past ten years. It has been pointed out in these columns that the idea of many as to what protection should be afforded by these attachments are rather vague, and the time required to get a clear view of the transitions through which this branch of signaling has gone during the past eighteen years which may be had by reading the paper upon the subject by Mr. V. Spicer which is found elsewhere in this issue, will for those interested will be time well spent. The ground has been gone over very thoroughly and intelligently in this paper and the record therein given is of special value inasmuch as operating officers to-day are in danger of wasting time by going over the old ground again through lack of complete information upon what has been tried and found wanting. It was only a few months ago that the chief engineer of an important trunk line insisted upon having electric locking which should lock the signals, cleared for a route, in their safety positions. As long ago as 1882 this was found to be dangerous practice and was laid aside by the Pennsylvania Railroad. It is to be regretted that this should need to be learned again and this instance alone shows the value of such a historical presentation of the subject. The advisability of placing such an important branch of railway operation in the hands of specialists is also clearly indicated by this writer, who shows that the apparatus has until recently been far in advance of the provisions which have been made by the roads for its care and maintenance. The large amount of space is given to this subject in the hope that mistakes may be avoided in the future through this opportunity for obtaining a clear comprehension of the field and the correct principles of electric locking protection.

TO one interested in progressive methods in railroad practice, and familiar with the radical improvements made in the mechanical and operating department, it is simply unexplainable why many of the practices adopted in the early days of railroading should be still retained in their original form, notwithstanding it is easily demonstrable that the method is cumbersome, inaccurate and expensive. These observations are provoked by the abandonment by the Vanderbilt lines of the settlement of earnings on through billing in the auditors' offices and the return to the old junction point settlements between agents. There is no more reason for the maintenance of the junction settlement plan in connection with freight shipments than there would be in

the adoption of the same method for the adjustment of passenger earnings. A coupon ticket is nothing but a through waybill on which a passenger is carried over various lines. The basis of divisions for the settlement of the total cost of transportation, is no more complete in a through passenger waybill than a through freight waybill. The instructions to the auditors' department and to the agents, both come from the same source, but the odds are that the matter is better understood and the records kept more complete in the office of the auditor than of the junction agent, so that the chances for error are much less in the one case than in the other. If it is claimed that the form of the respective through passenger and through freight waybills are different, it may be answered there is no reason why a coupon freight waybill cannot be used as well as a coupon passenger waybill. Indeed there are many reasons why such a form should be adopted for freight traffic. It is believed that the adoption of such a plan would be of material benefit to all concerned, and the first step towards such a result is the adoption of auditors' settlement.

UNDER the caption of "Nepotism in Railroad Service," a railway employe in Chicago sends us a communication which is published in this issue. That there has been in past years considerable foundation for the position taken by our correspondent cannot be denied, but with the progress of railroad affairs, this objective feature is rapidly disappearing. It may now be stated broadly that men are appointed to their positions because of their ability. On some roads this policy is carried to the exclusion of relatives of heads of departments, even though it is apparent the positions might be better filled by such a selection. It is also true that the old practice has not altogether died out and that the possession of family influence is responsible for some appointments. Many men are firmly convinced that their abilities do not receive proper recognition, but few men are competent to judge of their own qualifications. The same bias of which the writer in the communication referred to complains as existing in favor of relatives, is always present when the question relates to one's self. There need be no hesitancy on the part of young men in entering the railroad service at the present day because of any fear that their merits will not be recognized and as a rule rewarded. Circumstances of which they have no knowledge may in some cases prevent the realization of their expectations, but these exceptions are comparatively rare. A large number of cases could be cited where men holding responsible railroad positions have reached them solely on merit. Perhaps the most recent illustration is that of the president of the Santa Fe, who, commencing as an office boy, has reached his present position wholly through personal worth. Nepotism in the railway service is now practically a dead issue, and the few men who still practice it, will ere long, be compelled by force of circumstance to abandon the idea.

A WELL known authority on matters pertaining to the production of machinery, recently wrote the following. "If I had a little machine shop and four machinists, north, south, east, or west, I would have a good bright apprentice coming up to be the fifth and I would not keep him sweeping up the shop and cleaning castings, and waiting on every body, and then set up a howling jeremiad that boys didn't know anything nowadays. I would see that he got just as good work to do as he was competent to do and should expect that in about a year and a half he would be as valuable to me as the average journeyman I could find, and that when he got fairly started on his third year, I wouldn't swap him for any tramp journeyman that came along. I would see that the boy had his trade well, and made money in doing it, to say nothing of the pride of pointing him out as one of the products of my little shop. When my little shop grew larger, I should give more boys a chance to learn the trade." This may be taken as representing at the present time the feeling of a great many manufacturers with regard to the apprentice system. This sentiment seems to be growing as a result of a scarcity of good workmen. This attitude is plainly to be seen in the discussion of the apprentice question at the meeting of the Western Foundry-

mens' Association in March of this year, in which it was noticeable that a necessity for an improvement in the apprentice system exists, the only important differences which were expressed being as to how best to arrange the system. It is not necessary to recount the pros and cons of the question here further than to state that in order to be successful, inducements must be offered for boys to engage on the necessarily long term of preparation. It will be interesting to see what treatment the subject receives at the hands of the committee of the Master Mechanics' Association to which it was entrusted for report this year. The conditions obtaining in railway service while different in detail are similar in essential features to those existing in manufacturing establishments, and it is thought that the only way to obtain satisfactory results would be to treat the matter in about the way that it was handled by the Foundrymens' Association referred to. After a discussion, in which the experience of the members was brought out, the subject was referred to a committee which was appointed to draw up a set of indentures for submission at a future meeting. The committee which will report at the June conventions at Saratoga, will probably have accounts of the experience in advance, but whatever way the question is handled, much good may be expected from its agitation at this time, when there seems to be a greater need than ever for good and well trained mechanics.

#### INTELLIGENT APPREHENSION OF DUTY NECESSARY TO PROPER PERFORMANCE.

A superintendent of motive power who is well known as a successful manager of men recently remarked that it was his intention to know his men better; to take time occasionally to meet them and talk over matters having reference to their relation with the railroad and himself, in the effort to counteract to some extent the tendency toward what he termed "militarism," the word being used to represent the idea of the necessity of blind obedience to instructions without reference to the degree of understanding possessed by subordinates as to why such and such orders were given. Such an idea seems all wrong to those officers who believe that employes should tacitly obey orders verbal or written without the necessity of understanding in the slightest degree the reasons for their issuance or the effect desired to be reached. But is not the operation of a railway entirely different in every respect from the purpose of a military organization, the only similarity between them being that both are divided into departments, commanded by officers vested with authority proportionate to their responsibilities. The element of perfect obedience to instructions must be present in both systems; but there are two kinds of obedience, blind and intelligent, and the latter is unquestionably greatly to be desired in such a complex business organization as is found in a railway company.

The obedience of the chief of a department to his superiors is of the intelligent type, inasmuch as it is a part of a plan in which the subordinate consults with his superiors. The same idea is being carried out to a great extent in the gathering of members of different departments for the discussion of questions interesting and affecting all of the members. Upon large roads these meetings have grown in many cases to be technical conventions on a small scale, the practical and direct value of which is far reaching. They are to be encouraged because of their uplifting and broadening effects. They make office men feel that they have a part in a great work to perform and that they are important spokes in the wheel. They make men less machine like which is a worthy object, and in view of the value of this in all other departments, is not the superintendent referred to on the right track when he is trying to make the men of low grade in his department less blind servants than they ordinarily are expected to be? This officer does not abate the requirements for strict obedience in the slightest, but he is likely to receive the co-operation of the men if they understand what they are doing, which is of great assistance to him in his work.

This question has its sociological features in the relations between employer and employe which are not kept sufficiently in mind. Attention is called to

them by an excellent paper recently read by Mr. H. D. Judson, division superintendent of the Chicago, Burlington & Quincy R. R., before the Western Railway Club, which will be published in these columns in the near future. It is apparent that there is a growing interest in the subject of the treatment of employes, and it is believed to be in the direction pointed out above, that these problems may be satisfactorily settled. The idea that a man resembles a clock, which is wound up at regular intervals by a key in the form of a pay envelope, and which in running down, will perform precisely and exactly a certain service which is an equivalent to the force of the winding, is soon to be laid aside, and the sooner the better. It has been said that one of the greatest weaknesses in the present industrial system, is that the employers do not know their men. This is true of railroads to a certain extent, and the spread of the friendly sentiments referred to and their intelligent application to the special conditions of each department down to the lowest, cannot fail to produce a beneficial result.

#### REPEAL OF THE IMPRISONMENT CLAUSE OF THE INTERSTATE COMMERCE LAW.

Considerable comment has been indulged in throughout the country during the past week because of the alleged discovery of a bill introduced in the lower house some two weeks ago and which had favorably been reported by the committee on interstate and foreign commerce. The object of the bill is to remove from railroad officials their personal responsibility for acts done on behalf of the corporation by which they were employed and to abolish the imprisonment penalty to which they are now subject, substituting therefor a penalty of five thousand dollars (which the committee recommended be raised to fifteen thousand) to be assessed against the corporation. The usual "scare heads" accompanied the account of the "discovery" in the newspapers, by which it was made to appear that the act to regulate commerce was in danger of being altogether defeated by the machinations of the wily railroad officials; and it was broadly stated that without the imprisonment clause the law would be a mere plaything, because there was no railway in the United States "that could not afford to be indicted, convicted and fined to the full limit every month in the year." According to these writers "traffic men will snap their fingers at the law, for while the corporation employing them was being fined fifteen thousand dollars for violating the law they might be out on the road arranging another violation that would bring in revenue enough to pay the fine a hundred times over."

It would seem as if with all the information obtainable respecting railroad revenues, correspondents would know too much to write and editors too much to publish such absurd statements. The popular idea regarding railway earnings appears to be that a few hundred thousand dollars more or less is a matter of no consequence and that railroad managers are perfectly indifferent to such small things; but it may be stated without fear of successful contradiction that no other commercial enterprise can show such close attention to the question of expense as may be seen upon any well conducted railroad. As an illustration of the closeness with which such matters are watched, it may be said that upon a system embracing a number of thousand miles of road and which is regarded as one of the best managed in the country, the head of a department was called upon to explain why in a certain month he had used a dozen more pencils than during the preceding month. Nor on the system referred to was such oversight confined to the general office. It extended to all departments of the road, and it is safe to say that should the company be subjected to a fine of any considerable amount, because of the violation of the law by an official of the traffic department, a competent explanation or his resignation would be demanded.

To show the absurdity of the statement that a railroad could well afford to pay fifteen thousand dollars for a violation of the law, some figures based upon the latest annual report of the Lake Shore & Michigan Southern Railroad may not be amiss. This road is confessedly economical in the matter of train haulage, and yet to earn a single fine of fifteen thousand dollars it would be obliged to haul, on the basis of last year's figures, six hundred thousand tons an av-

erage distance of one hundred seventy-two miles, that being the average haul of freight shipped over the line. Or put into another shape, it would require the hauling of its average trains twenty-nine thousand miles in order to earn the amount of the fine. If any one supposes that a railroad company will long retain the services of an employe who subjects them to any such expenditure, he has very little knowledge of the business.

Coming back to the subject matter of the bill referred to, it will be remembered that this journal has steadfastly advocated the expurgation of the imprisonment clause from the law, ever since it became operative; and this, not from any desire to shield the violators of the law, but because of the manifest impossibility of obtaining convictions under the law. Railroad officials would not willingly furnish the testimony necessary to secure conviction, because of the consequences attaching to their associates, and so long as the giving of testimony was practically optional with the witness, the law was to all intents and purposes inoperative. And it was further thought that so far as checking violations was concerned, a fine imposed upon the corporation would be fully as effective as the imprisonment of an official, and therefore it would add to the efficiency of the law to make the change. Now, however, the case is different. Witnesses can be compelled to testify and convictions can be secured regardless of the inclination of witnesses, so that the proposed amendment will in no way contribute to the better administration of the law. The conditions which made the abolition of the imprisonment clause desirable, having been altogether changed by the decision in the Brown case, there would seem to be no further need of advocating the amendment, and the RAILWAY REVIEW therefore hopes that the bill in question will be defeated and the law, so far as it relates to this particular feature, be allowed to stand in its present form.

#### Opening of the M. C. B. Convention.

It is announced that Colonel H. S. Haines has consented to deliver the opening address at the approaching convention of the Master Car Builders' Association at Saratoga. The fact that a man of his ability is to speak on that occasion, will undoubtedly insure a good attendance at the opening session. The association is to be congratulated in securing such an interesting speaker, and a mere mention of the announcement will be sufficient inducement for members to be present.

#### PACKING FOR PISTON RODS AND VALVE STEMS.

The subject of packing for piston rods and valve stems was introduced at the April meeting of the New England Railroad Club by Mr. T. P. Purves, Jr., master mechanic of the Boston & Albany Railroad who spoke as follows:

Numerous and varied are the forms of metallic rod packing now in use, but from the information I have at hand, there seems to be but two styles that are used to any great extent at the present time: viz "the United States" and the "Jerome." By referring to the subject, you will understand that it is not within our province to say which of the two forms gives the best results. By this we mean which can be maintained at the smaller cost; also which will cause the least trouble to keep tight. I am not in a position to give any information regarding the cost or durability of any form of packing, except the "United States," as every locomotive on the Boston & Albany is equipped with this packing. We adopted it in 1881, and equipped every engine as soon thereafter as possible, and it has given the best of satisfaction. Metallic packing, like all other parts of the locomotive, must receive attention in order to get the proper results; and if the different parts are carefully examined, and put in good condition when engines are in the shops for general repairs, little difficulty will be experienced in maintaining it at a comparatively small cost until the engine is again taken to the shop.

We have found it more of a problem to maintain valve rod packing than piston rod packing. This may be attributed to several causes. The valve rod receives a motion from the rocker arm that causes the ball joints to wear more rapidly in the former than the latter. The changing of the path of wear, is caused by the variation of the travel of valve, and one of the greatest annoyances, is caused by the valve rod getting sufficiently low to allow it to come in contact with the cast iron packing case, thereby wearing the rod directly in the path of the packing rings. Provision is made to overcome this difficulty by inserting a bushing in the stuffing box or back end of packing case. This method will answer the purpose for a while, but the weight of rod and yoke being constant renewals of these bushings are frequently necessary. An-

other important objection to sustaining the weight in this manner is that the rod also wears very rapidly at this point, and the life of the rod will be determined by this wear, rather than by the wear of the packing. In our experience we found it preferable to put all the weight of the yoke and rod on the valve. To do this we place a wrought iron band around the body of the valve, the bottom of this band bearing on the wings of the valve, and being of sufficient height or thickness that when the yoke rests upon it it will maintain the center line of the rod above the center line of the steam chest. This same difficulty will sometimes occur with the piston rod packing where solid piston heads are used, and the bottom of the head and the bottom of the cylinder become sufficiently worn to allow the piston rod to drop below the center line of the stuffing box, thereby throwing the weight of these parts directly on the packing rings. I understand that the Old Colony Railroad is using a device to obviate this difficulty with valve rod packing. The diameter of the rod at the yoke, and extending about six inches toward the end of the rod, is one-fourth of an inch larger than the original diameter, with a thread cut to receive a composition sleeve. This sleeve wears on the stuffing box bushing, and is easily renewed when necessary.

We have also found it an advantage to cut the packing rings in two parts, which admits of making renewals without disconnecting the valve rod at the union nut or knuckle joint, or removing the piston rod from the cross-head. By avoiding the latter we eliminate in a measure the danger of fracturing the rod at this point, and which frequent driving of the cross-head key invites. Another factor, and a very important one, too, in obtaining good results from metallic packing, is to make it from just the proper kind of material. The best is none too good for this purpose. The following formula we have found very satisfactory. Copper, one part; antimony, two parts; Malacca tin, six parts; to each one and one-quarter pounds of this mixture, add two pounds of tin. The quality of this babbitt metal depends upon the quality of tin used. Good bread cannot be made from an inferior brand of flour; neither can good babbitt metal be made by using an inferior brand of tin. If too hard, it will cause no end of trouble by frequent breakings; if too soft, it will wear rapidly, both on the rod and in the cone, and the smaller or inside ring will soon be forced through the packing cup. Lubrication also plays an important part in the efficiency of the packing rings, and we find some engineers do not give it the attention they should. Oil cups designed for this purpose should be kept in working order, and never allowed to run without covers; otherwise they will soon become inoperative, by reason of sparks and dirt that accumulate in them.

The cost of maintaining metallic packing varies with the service of the locomotive. We find that in heavy freight service the cost is fully 100 per cent more than in switching service. The comparison is as follows:

Cost per 1,000 miles, switching engines, 15 cents.
“ “ “ “ passenger “ 21 “
“ “ “ “ freight “ 36 “

which gives an average cost per 1,000 miles of 25 cents. This includes the material and labor required to manufacture the rings; also the time of the man who makes the application.

Mr. Henry Bartlett of the Boston & Maine Railroad, contributed to the discussion as follows:

Of the 700 engines which we have to-day, 320 are equipped with metallic valve stem packing and about 525 have metallic piston rod packing. We are equipping all the others as fast as they pass through the shop. We are quite well aware of the fact that metallic packing is a paying investment. From what few figures I have on the matter, it seems to me that there is a saving of about five dollars per engine per year on metallic valve stem packing and about ten dollars per year on metallic piston rod packing. Those are general figures—about fifteen dollars per year an engine over hemp packing. Metallic packing has been known with us to run as high as twenty-seven months without any repairs. On an average it only runs twelve months, but often from fifteen to eighteen months with good care. Hemp packing as a rule takes repairs every two weeks perhaps, or something of that sort. We manufacture our own metallic packing. The company bought the right to do this some years ago. As to the cost of equipping an engine with metallic packing above hemp packing, I am not able to say just what that is. I presume it costs something in the neighborhood of five dollars more to equip an engine with metallic packing than with hemp packing.

#### The Railway Signaling Club.

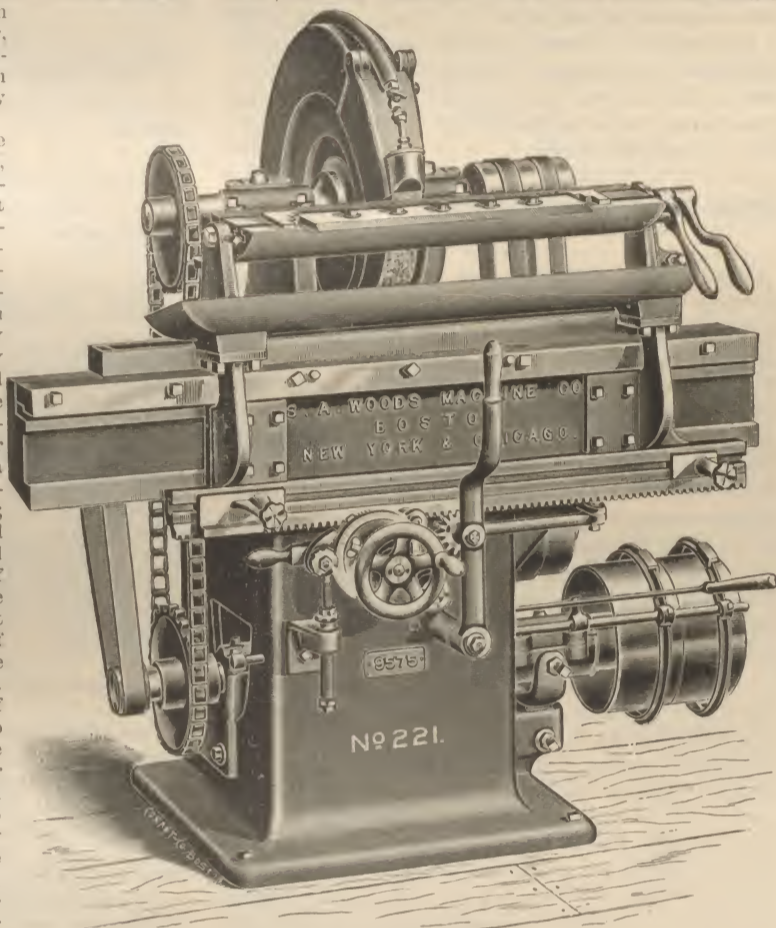
The May meeting of the Railway Signaling Club was held at the Great Northern Hotel, Chicago, on Tuesday of this week, at which the paper by Mr. V. Spicer, which appears in full elsewhere in this issue, was read and discussed. The next meeting will be held September 8.

#### AN AUTOMATIC KNIFE GRINDER.

A new automatic knife-grinding machine has been brought out by the S. A. Woods Machine Co., of Boston, which is illustrated by the accompanying engraving. This machine was specially designed for such work as is required in car shops for grinding straight knives of all kinds and lengths up to the capacity of the machine. It is said to be a superior machine for grinding, planing, paper cutting and other knives requiring absolutely straight and true edges. It is provided with power feed and is adapted to either wet or dry grinding.

The frame is compact, very solid on the floor, no jar is experienced when running, and all of the working parts are protected from dust and water.

The carriage has a constant reciprocating movement, and the wheel is fed to the knife automati-



#### AUTOMATIC KNIFE GRINDER.

cally. The length of stroke is governed by adjustable stops. In the illustration the knife-bar is shown in a convenient position for setting the knives before grinding. This bar can be set to grind either from or toward the edge of knife, and at any desired bevel. Gages at each end of the knife-bar are provided by which the knife is quickly set in the proper position. The feed can be set to grind as coarse or fine as may be desired, and when once set for any piece of work it requires no further attention. The feed ceases to act when the point is reached for which the index has been set, and the knife is not unduly wasted.

When used for wet grinding, a steady supply of water is fed to the work by a novel automatic pump, so constructed that no working parts come in direct contact with the water, and which cannot become worn away by grit or dirt. An adjustable hood prevents the water from being thrown off by the wheel, and suitable channels conduct it back to a tank attached to the base of machine. The arbor is of best cast steel and runs in self-oiling boxes. A wheel of quality best suited to the work, 26 in. diameter by 1½ in. face, is furnished with each machine. The machines are built to grind knives 30, 36, 40 in. in length and upwards. The floor space required is 5x3 ft. The weight of the machine is 1,500 lbs. Tight and loose pulleys are provided 10 in. diameter and with 4 in. faces. The speed of the driving pulleys on the machine should be about 350 revolutions per minute.

#### Meeting of the International Association of Car Accountants.

Your committee on arrangements gives notice that the Hollendon Hotel, Cleveland, has been selected as headquarters. Meetings of the association will be held in the rooms of the Chamber of Commerce, in the Arcade building, one-half block from the hotel. Members can secure transportation for themselves and families from Detroit, Toledo or Buffalo via the boat lines upon application to Mr. W. J. Robertson, chairman committee on arrangements, Cleveland, O.

As regards railroad transportation, members should secure their own transportation through their proper officers, excepting such transportation as will be sent them by the committee on arrangements.

As regards sleeping cars, the delegates using the Pullman Palace Car Company should pay fare on the going trip, taking receipt for same, which upon presentation, with credentials, to Pullman's representative at Cleveland, passes will be issued for the return trip.

For delegates using the Wagner Palace Car Company it will be necessary to pay their fare in both directions, taking receipt for same, and on forwarding the receipts, credentials, to the office of the general manager, at Chicago, one half of the amount will be refunded.

#### TESTS OF ARCHES OF CORRUGATED STEEL.

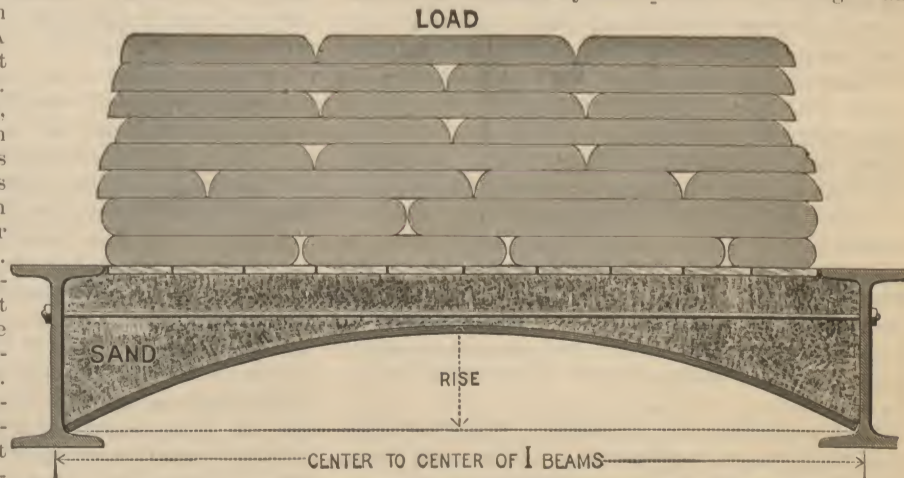
In the RAILWAY REVIEW of March 21, current volume, an article was published which attracted considerable attention, giving the results of a number of tests of different styles of arches, showing their relative strength. These tests were made by the Austrian Society of Engineers and Architects, and while the tests included two corrugated iron arches, still they did not treat as exhaustively of these as of other styles.

Since the publication of this article, a circular has been received from the Cincinnati Corrugating Co., of Piqua, O., which they have recently published, giving results of a large number of test which they have made with corrugated steel arches during the past year. These tests have been very carefully made and at a great expense, with the idea originally of establishing the data for the use of the company. However, having received a number of inquiries from mechanical engineers and other interested, asking what weights different arches would bear, they decided to publish the results for general distribution. This is a matter of general interest, and while space will not permit of going into details, a part of the circular is given here.

The accompanying illustration shows how the tests were made: The two I beams were held together by tie rods and were also fastened at the bottom by a heavy bar passing around the lower flanges of beams, making it impossible for the beams to move; the corrugated sheet was then put in place and covered with dry sand, as being the best material that could be used to secure an equal distribution of the weights. One inch boards were placed on top of the sand, but the boards did not touch the I beams, being kept clear so that the full weight of the load would bear directly on the corrugated steel arch.

All the arches were loaded until they deflected at center one-quarter of an inch, which was the deflection which they would stand without injury to the floor. Afterward weight was added, in many cases sufficient to break the sheet, so as to ascertain the extreme load which any arch would bear. Trautwine gives 90 lbs. per square foot as the weight of the greatest crowd that could well congregate on any floor, so it will be seen that even the lighter arches will sustain many times the required weight in this class of work.

Also, these manufacturers state that the heavier gages of arches can be used to a good advantage in factories, or in fact anywhere where any other arches can be used, as the heavier gages of iron arches far exceed any other arches in strength and



METHOD OF LOADING CORRUGATED STEEL ARCHES.

also for cheapness, especially considering the fact that the heavier arches can be made in extremely long length, permitting a construction requiring fewer I beams, and therefore less cost, and also less weight on the walls of the building. From the results of these tests it is evident that steel arches are entitled to high consideration at the hands of the architect and the engineer. The results are as follows:

**Test No. 1—**

Arch made of No. 24 U. S. gage steel;  
Size of corrugation,  $2\frac{1}{2}$  in.;  
Length of base, 4 ft.;  
Rise of arch, 7 ft.;  
Load at  $\frac{1}{4}$  inch deflection, 6,271 lbs.;  
Load at breaking 6,559 lbs. or 726 lbs. per sq. ft.

**Test No. 2—**

Arch made of No. 22 U. S. gage steel;  
Size of corrugation,  $2\frac{1}{2}$  in.;  
Length of base, 4 ft. 0 in.;  
Rise of arch, 7 in.;  
Load at  $\frac{1}{4}$  inch deflection, 7,839 lbs.;  
Load at breaking, 9,118 lbs. or 1,010 lbs. per sq. ft.

**Test No. 3—**

Arch made of No. 20 U. S. gage steel;  
Size of corrugation,  $2\frac{1}{2}$  in.;  
Length of base, 7 ft.;  
Rise of arch, 8 in.;  
Load at  $\frac{1}{4}$  inch deflection, 4,116 lbs.;  
Load at breaking, 12,105 lbs. or 770 lbs. per sq. ft.

**Test No. 4—**

Arch made of No. 18 U. S. gage steel;  
Size of corrugation,  $2\frac{1}{2}$  in.;  
Length of base, 8 ft.;  
Rise of arch, 10 in.;  
Load at  $\frac{1}{4}$  inch deflection, 4,624 lbs.;  
Load at breaking, 13,400 lbs. or 748 lbs. per sq. ft.

**Test No. 5—**

Arch made of No. 16 U. S. gage steel;  
Size of corrugation,  $2\frac{1}{2}$  in.;  
Length of base, 9 ft.;  
Rise of arch, 12 in.;  
Load at  $\frac{1}{4}$  inch deflection, 6,496 lbs.;  
Load at breaking, 14,324 lbs. or 716 lbs. per sq. ft.

**Test No. 6—**

Arch made of No. 16 U. S. gage steel;  
Size of corrugation, 3 in.;  
Length of base, 5 ft.;  
Rise of arch, 7 in.;  
Load at  $\frac{1}{4}$  inch deflection, 16,909 lbs.;  
Load at breaking 36,905 lbs. or 3,289 lbs. per sq. ft.

**Test No. 7—**

Arch made of No. 14 U. S. gage steel;  
Size of corrugation, 5 in.;  
Length of base, 5 ft.;  
Rise of arch 6 in.;  
Load at  $\frac{1}{4}$  inch deflection, 19,615 lbs.;  
Load at breaking, 41,780 lbs. or 3,757 lbs. per sq. ft.

#### TECHNICAL MEETINGS.

Annual convention Master Car Builders' Association, June 17, Saratoga, New York.

Association Railway Claim Agents, May 27, Monongahela House, Pittsburgh, Pa.

International Association Car Accountants, June 9, Cleveland, Ohio.

Annual convention American Master Mechanics' Association, June 22, Saratoga, New York.

Association American Railway Accounting Officers, May 27, New York City.

Association Railway Telegraph Superintendents, June 17, Fortress Monroe, Va.

American Association General Baggage Agents, July 15, Philadelphia, Pa.

The American Society of Civil Engineers holds meetings on the first and third Wednesdays in each month, at 8 p. m., at the House of the Society, 127 East Twenty-third street, New York City.

The Association of Civil Engineers of Cornell University meets weekly every Friday, from October to May inclusive, at 2:30 p. m., at Lincoln Hall, New York.

The Boston Society of Civil Engineers, meets monthly on the third Wednesday in each month, at 7:30 p. m., at Wesleyan Hall, 36 Bromfield street, Boston, Mass.

The Canadian Society of Civil Engineers meets every other Thursday at 8 p. m., at 112 Mansfield street, Montreal, P. Q.

The Foundrymen's Association meets monthly on the first Wednesday of each month, at the Manufacturers' Club, Philadelphia, Pa.

The International Irrigation Congress will hold its fourth session at Albuquerque, N. M., September 16-19. Fred L. Alles, secretary, Los Angeles, Cal.; local secretary, W. C. Hadley, E. M., Albuquerque, N. M.

The Montana Society of Civil Engineers meets monthly on the third Saturday in each month, at 7:30 p. m., at Helena, Mont.

The New England Railroad Club meets on the second Tuesday of each month, at Wesleyan Hall, Bromfield street, Boston, Mass.

The New York Railroad Club has a monthly meeting on

the third Thursday in each month, at 8 p. m., at 12 West thirty-first street, New York City.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m., at the St. Paul Union Station, St. Paul, Minn.

North-West Railway Club meets alternately at the West Hotel, Minneapolis, and the Ryan House, St. Paul, on the second Tuesday of each month.

The Engineering Association of the South meets on the second Thursday of each month at 8 p. m., at the Cumberland Publishing House, Nashville, Tenn.

Annual meeting Traveling Engineers' Association, Minneapolis, Minn., Sep. 8, 1896. W. O. Thompson, secretary 415 Marion street, Elkhart, Ind.

Annual Convention Roadmasters' Association and Road and Track Supply Association, Cataract Hotel, Niagara Falls, N. Y. second Tuesday in September, 1896.

The Railway Signaling Club holds its meetings in Chicago, Ill., on the second Tuesday of January, March, May, September and November. G. M. Basford, secretary, 818 The Rookery.

The Southwestern Society of Mining Engineers will hold a session at Albuquerque, N. M., September 16-19. Walter C. Hadley, secretary, Albuquerque, N. M.

The Southern & Southwestern Railway Club holds its meetings on the third Thursday of January, April, August and November, at the Kimball House, Atlanta, Ga.

#### The Road and Track Supply Association.

At a meeting of the committee of arrangements of the Roadmasters' Association and the Road and Track Supply Association at Niagara Falls arrangements were made with the proprietor of the Cataract Hotel, Niagara Falls, for the meeting of the two associations at that house at the annual convention on the second Tuesday in September. The programme has been arranged and will include many social features, as well as a boat trip to Toronto and back.

#### PERSONAL.

Mr. McJames Osborne has been appointed assistant to the new vice president of the Canadian Pacific, with office at Montreal.

Mr. W. A. Kellond, division superintendent of the Illinois Central has been elected president of the Memphis Passenger Association.

Mr. B. F. Blake has been appointed assistant general freight and passenger agent of the Plant system, with headquarters in Boston.

Mr. A. A. Jack has been appointed traveling immigration agent of the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Detroit, Mich.

Mr. D. R. Hurst, general yardmaster of the Lake Erie & Western at Lima, has been appointed trainmaster of the Joliet division of the Chicago & Alton.

Mr. T. J. Hennessey has been appointed master mechanic of the Michigan Central shops at Jackson, Mich., and has assumed the duties of the position.

Mr. Geo. W. Prescott, who recently resigned as superintendent of motive power of the Vandalia, has been placed at the head of the Novelty Iron Works at Dixon, Ill.

Mr. Charles H. Angel has gone to Atlanta to represent the Monon, vice Mr. L. R. Sams, who resigned some time ago. Mr. Angel formerly represented the Chicago, Milwaukee & St. Paul at Buffalo.

Mr. Chas. L. Martine has been appointed superintendent of the Rumford Falls & Rangeley Lakes Railroad, in place of Mr. L. L. Lincoln, resigned. Mr. Martine has been assistant on this road since last fall and assumed the duties of superintendent May 1.

Mr. Marvin R. Maxwell, for several years freight agent of the Lake Erie & Western at St. Louis, yesterday accepted the position of general freight agent of the Louisville, Evansville & St. Louis. It is stated that the vacancy will probably be filled by promotion.

Mr. J. S. Beale, agent of the Columbus, Sandusky & Hocking at Sandusky, has been appointed traveling freight and passenger agent of the line in northern Ohio and northern Indiana. His headquarters will be at Marion, Ohio. Mr. C. N. Freeman will succeed Mr. Beale at Sandusky.

Mr. J. W. Wheeler has been appointed agent of the Asheville fast freight line, operating over the Southern railway, his headquarters to be at Louisville. This indicates that the Southern is to compete with the Kanawha Dispatch, the freight line operating over the Chesapeake & Ohio.

President Spencer, of the Southern Railway, has issued an executive order by the terms of which Second Vice President W. H. Baldwin, Jr., will take charge of the traffic department of the road. The vacancy caused by the resignation of W. W. Finley, to go to the Great Northern, will not be filled at present.

Mr. J. T. Odell, who was for four years general manager of the Baltimore & Ohio, and who, since 1893, has been vice president and general manager of the New York & New England, has resigned that position and has gone to Pittsburgh, as president of the Butler & Pittsburgh road, a new line to be built between Butler & Pittsburgh.

Mr. George H. Foote has been appointed district pas-

senger agent of the Chicago, Milwaukee & St. Paul. He has jurisdiction over the passenger business originating in Kansas City and its immediate vicinity, and also on connecting lines in southwestern Missouri, Kansas, Oklahoma and Indian Territory. On and after June 1, his office will be located at Kansas City.

An official circular issued from the general office of the Chicago, Lake Shore & Eastern announces the following appointments: Mr. C. J. Clifford is hereby appointed superintendent of motive power of the Chicago, Lake Shore & Eastern Railway Co. Mr. E. B. Smith is appointed master car builder, reporting to superintendent of motive power. Appointments were effective May 7.

Mr. H. E. Riggs for a number of years chief engineer of the Ann Arbor road and which position he resigned last January, has been appointed chief engineer of the Toledo, Bowling Green & Fremont electric line. Builders of electric lines are becoming convinced that it is as necessary to lay their tracks well on a good road bed as it is for steam roads. With this idea in view the company has appointed Mr. Riggs to take charge of the work.

The resignation of Mr. C. A. Chambers as general agent of the Cleveland, Akron & Columbus having been tendered and accepted, he left the service of that road on May 15, to fill the position of general agent of the Lima Northern & Ohio Southern, to which he has been appointed. Mr. Chambers' headquarters will be at Cincinnati, and he is said to be considered one of the best freight men that travel out of that city. Mr. Chambers' successor has not yet been appointed.

Mr. William Simpson Sloan, vice president of the Delaware, Lackawanna & Western road, died at New York on the 11th inst. after a protracted illness. He was the son of Samuel Sloan, president of the Lackawanna and was born in 1859. He was also vice president, of the Fort Wayne & Jackson road. He began his railroad career in 1883 as assistant general freight agent of the Delaware, Lackawanna & Western, a few months later was appointed general freight agent, and in 1890 was elected vice president.

Mr. Henry C. Parker, general traffic manager of the Lake Erie & Western road, was found dead in his bed on the morning of the 15th inst., in Indianapolis. His death was due to heart failure. Mr. Parker was born in New York city in 1851, entering railway service in 1869 with the Empire fast freight line, with which company he remained in various positions until 1880. From 1880 to 1886 he was traffic manager of the Peoria, Decatur & Evansville at which time he was made general freight and passenger agent of the Michigan & Ohio. In April, 1887, he became general traffic manager of the Lake Erie & Western, which position he still held at the time of his death.

At a meeting of the directors of the Atchison, Topeka & Santa Fe Railway Company, held on the 6th day of May, 1896, Mr. H. C. Whitehead was elected general auditor, vice Mr. W. K. Gillett, resigned. Mr. Whitehead will at once assume the duties of his position. Address, Great Northern building, 77 Jackson street, Chicago. Mr. Whitehead was born at Brampton, Ont., in 1853, and entered railway service in 1872, as an office boy in the general freight office of the Kansas Pacific, remaining with this road in various capacities until 1880 when he became accountant and paymaster of the Mackinac extension of the Michigan Central road. From 1881 to 1882 he was traveling auditor of the Atchison, Topeka & Santa Fe and from the latter date to 1888 auditor of the Southern Kansas, at which time he went to California as auditor of the California Southern and California Central Railways, now consolidated and known as the Southern California. This position he now leaves to become auditor of the Santa Fe.

Col. F. K. Hain of New York, vice president and general manager of the Manhattan lines, was accidentally killed at Clifton Springs, N. Y. on May 9. A train was switching cars from one track to another on the New York Central and in some unknown manner Col. Hain fell beneath the cars and was instantly killed. Col. Hain had been suffering for months from nervous prostration, caused by overwork. His wife and a nurse accompanied him to Clifton Springs, and since being there he had greatly improved. Col. Frank K. Hain was born in Pennsylvania in 1836, and commenced his railway career in early youth as an apprentice in the machine shop of the Philadelphia & Reading railroad. At the end of his apprenticeship he entered the United States navy at the age of 21 as an engineer, serving two years, and participating in some of the most memorable naval engagements of the late war. Among these were the capture of Forts Jackson and St. Phillip and the city of New Orleans by the fleet under Admiral Farragut. Withdrawing from the navy he entered into still more active service in the army, in which he won reputation as a brave and gallant officer. At the close of the war he obtained employment as a draughtsman with the Delaware, Lackawanna & Western Railroad Co. at Scranton, after which he entered the service of the Pennsylvania Railroad Co. at Altoona. Here his abilities as an executive officer were soon acknowledged and he was promoted to be superintendent of motive power for the Philadelphia and Erie Division of the road. From this position he withdrew to accept charge of the designing department of the great Baldwin Locomotive Works, of Philadelphia. In 1871 he visited Russia in the interest of the firm and spent sixteen months in introducing and putting into operation twenty anthracite coal burning locomotives which he had previously designed. Col. Hain was next offered the position of superintendent of motive power on the Erie Railway two years later, which he accepted, and afterward became general superintendent of

the Keokuk & Des Moines Railroad, maintaining his position after the road became merged into the Chicago, Rock Island & Pacific system. Col. Hain was best known to the New York public through his connection with the elevated railroads of that city. When the New York and the Metropolitan Elevated Railroad lines were leased to the Manhattan Co. it was found that a competent man was needed as general manager or superintendent. Russell Sage and the late Jay Gould recommended to the board of directors that Col. Hain be appointed to the position.

## RAILWAY NEWS.

**Cincinnati, Lebanon & Northern.**—It has been announced that the purchaser of the Cincinnati, Lebanon & Northern road at the sale last January, was the Pennsylvania Company, who secured it for a connecting link between Dayton and Cincinnati. A good deal of speculation was rife at the time it was bought in by Goodhart & Co., brokers, it being first given out that the Erie had secured the road for its independent entrance into Cincinnati from Dayton, and later it was unofficially announced that Brice got it for the Cincinnati, Jackson & Mackinaw system. Mr. E. L. Heinsheimer, one of the members of Goodhart & Co., has gone east with the stock. The road has valuable terminals in Cincinnati.

**Detroit & Mackinaw.**—The contracts for the extension of the Detroit & Mackinaw road from Omer southwest to Bay City, a distance of about 37 miles, has been let and one mile is already graded south from Omer. Four camps have been started and 200 men are at work. By the terms of the contract it is required to complete the first 7 miles by May 31, the next 10 miles by June 10, the next 5 miles by June 20, the fourth section of 5 miles by July 1, and the last 5 miles by July 10. The town of Standish, which by the first survey made last February, was on the line of the road, has been sidetracked, the road running within  $3\frac{1}{2}$  miles of the place. The contract is for about \$200,000.

**Duluth, Missabe & Northern.**—This line is now completed between Mississippi and Hibbing, Minn., to grading and tracklaying being done for the distance of 36 miles. Surveys are being made 10 miles north from Hibbing with expectation of building farther in the near future, but as yet no contracts have been let. Mr. J. F. Killorin of Swann river, Minn., is general manager.

**Elgin, Joliet & Eastern—Western Indiana.**—The Western Indiana road has been purchased by Attorney Crawford in the interests of the Elgin, Joliet & Eastern, and in an interview acknowledging the fact, Mr. C. H. Ackert of the E. J. & E. is credited with saying: "There are only about three miles of trackage belonging to the road, and that runs from the Indiana state line to the Grasselli Chemical Works. There are, however, along the line about twenty large industries from which a large amount of freight is shipped daily. One reason for our purchase of the road was to give us ready access to the chemical works and these industries. The new trackage will be used for our road simply as a feeder."

**Green Bay, Winona & St. Paul.**—At the foreclosure sale of the Green Bay, Winona & St. Paul Ry., which after various postponements was brought on May 12, the main line of the road was bought by M. T. Cox of New York on behalf of the reorganization committee of bondholders, for \$1,000,000. The line extends across Wisconsin from Green Bay to Eastmore, Buffalo county, with a branch from Onalaska to La Crosse. It was bid in by Cox as an individual for \$20,000. The sale was made on motion of the Farmers' Loan & Trust Co., trustee, and was conducted by F. M. Hoyt of Milwaukee. Half a million dollars will be spent in improvements.

**Jupiter & Lake Worth.**—Messrs. Sable Bros., of Jacksonville, the recent purchasers of the Jupiter & Lake Worth road, will immediately remove the entire plant, rails, rolling stock, etc. This road was built in 1889-90, and was a part of the Jacksonville, Tampa & Key West Railway. Its length is only 8 miles, between Jupiter and Juno.

**Lake Erie & Western.**—The ninth annual report of the president and directors of the Lake Erie & Western Railroad Company to the stockholders has been issued and shows: Gross earnings, \$3,589,104.25; operating expenses, \$1,916,143.57; net earnings, \$1,602,960.69; interest, taxes and rentals, \$701,786.16; balance, \$901,174.53; dividend of 5 per cent on preferred stock, \$592,000.00; surplus, \$309,174.53. The gross earnings as compared with last year show an increase of \$173,700.54. The net earnings increased \$123,408.91, and the surplus after the payment of charges and dividends, increased \$104,605.52. In summarizing this report an eastern paper says: "It is interesting mainly as showing the experience of a road which depends largely for its prosperity upon local traffic, both passenger and freight. This road has been successful in maintaining a dividend rate of 5 per cent on its preferred stock, even through the period of business depression when many other roads have barely been able to earn fixed charges. Not only have these dividend requirements been met, but the company has had a sufficiently large balance to warrant it in using a portion of its earnings for expenditures for betterments and equipment. The company is now paying dividends at the rate of 5 per cent per annum, having increased the rate during the past year. Dividend payments of 5 per cent on \$10,394,600 of capital stock call for about \$520,000, from which it appears the company has earned about \$55,000 more than a 5 per cent dividend, after paying interest charges and a decidedly increased amount for operating and maintenance. The company has actually paid dividends during the year amounting to \$457,362, or  $4\frac{1}{2}$  per cent

on the outstanding capital stock. The year's operations show an improvement in respect to what is commonly known as 'freight density.' Any improvement like this tends to reduce expenses of operating, especially when coupled with a decrease in the freight train mileage per mile. The above figures taken together show that while the road is receiving low rates for carrying its freight, the management is endeavoring to show every possible economy in the matter of handling it."

**Mexican International.**—A New York dispatch under date of May 12, says: "Mr. C. P. Huntington has just received from the Mexican government a concession of great value in behalf of his Mexican International Railroad Co. During each period of two years from the promulgation of the contract (May, 1895), the company must construct at least 200 kilometers of railroad and the lines stated in the contract must all be completed before May, 1906. There is to be a fine of \$15,000 in national securities for each year in which the company does not live up to these terms. In consideration of the fact that the contract carries no subsidy the Mexican government agrees not to subsidize any other line paralleling the present line of the International or located within 40 kilometers of it. The new roads which the company binds itself to build are as follows: From City of Mexico to Piedras Negras; from a point on the main line to some port on the Gulf of Mexico, between Matamoras and Vera Cruz, and from a point on the main line to a Pacific port between Mazatlan and Zihuatanejo. The road is to have the right of building branches not exceeding 170 kilometers in length to any of the above new roads. These are plans that will affect all railway enterprises in Mexico to an important extent."

**Minnesota & Wisconsin.**—The sale of the Minnesota & Wisconsin road which was to take place at Hudson, Wis., on May 12, was postponed until June 26, there being no bidders present. This railway runs from Emerald, St. Croix county, to Spring Valley, Pierce county, a distance of 22 miles, and is known as the D. M. Sabin road. Mr. D. B. Dewey, of Chicago, is receiver.

**Northeastern Railroad of Georgia.**—The Northeastern Railroad, which belongs to the state of Georgia, has been leased to Ed Richards & Co., for \$18,600 a year. The present line is 39 miles in length, but it is thought that the syndicate of which Mr. Richards is representative, will extend the road into the marble fields of North Georgia. It is said some New York capitalists are interested in the project.

**Northern Pacific.**—It is now expected that the sale of the properties of the Northern Pacific Co. will be begun on or about August 1, but the exact date cannot be fixed until all of the notices of sale have been prepared. There are something like 40,000,000 acres of land to be sold among other things, and the notices must contain a full description of the property. It will take a long time to prepare these notices, and the work will commence just as soon as the lawyers get back to New York. The attorneys and parties in interest were in Milwaukee for a few hours on the return trip from the Pacific coast, on May 11. All of the processes in the foreclosure proceedings are now complete, decrees having been entered in all the courts along the line.

**Rutland.**—Judge Wheeler in the United States court at Brattleboro on May 5 decided that the Rutland R. Co. should take possession of its road at midnight on May 7. Since 1871 this road, which extends from Burlington to Bellows Falls, a distance of 120 miles, has been a leased line of the Central Vermont. For several years the Central Vermont has been paying a rental of about \$1,000 a day. The road did not pay, and when the Central went into the hands of receivers measures were taken which brought about this decision. The Rutland road rolling stock has now been sent to that division, and it is to be operated by President Percival W. Clement of Rutland.

**Salt Lake & Pacific.**—This company, recently organized at Salt Lake City, with the Utah & California, has been granted by the city some valuable land for its terminals, now used for park purposes. This grant was secured by promises to build a railroad west to Salt Lake City to connect with some line to Southern California. The line is projected from Salt Lake City to Muncie, a distance of 200 miles. The grading is already done from Saltair Beach to Garfield—4 miles—and the contract for grading an additional 7 miles has been let to J. C. Watson & Bro. of Salt Lake City, and the contract for 30,000 ties has been awarded to Eli Openshaw of Santaguin, Utah. No iron has as yet been laid, but will follow as soon as the work of grading which is now in progress is ready for it. The incorporators include G. Q. Cannon, N. W. Clayton and other men well known in Salt Lake City. They now control the Salt Lake & Los Angeles, built from Salt Lake City to Saltair, Utah, about 15 miles. The Utah Improvement Co. has been formed by the directors to control the stock of both railroads.

**Santa Fe, Prescott & Phoenix.**—It is stated that the rails and right of way of the Prescott & Arizona Central road (now abandoned) running from Prescott to Seligman, a distance of 72 miles, has been purchased by the Santa Fe, Prescott & Phoenix. A branch of this line 4 miles in length is to be built to the Congress mine in the Weaver district, southwest of Prescott.

**Tacoma & Lake City Railway & Navigation.**—Receiver E. E. Ellis, of the Tacoma & Lake City Ry. & Navigation Co., has been authorized by Judge Pritchard to receive private bids for the purchase of the road; which is not at the present time paying all operating expenses. He stated that under the present financial condition of the road it would be wisest course to sell it if a reasonable price for the property could be secured. This permission is given with the

proviso that the purchaser, whoever he may be, must keep the road in operation as required in the original contract of purchase. After the bids have been received Receiver Ellis is required to submit the one he deems best and most satisfactory to the court for consideration and authority to close with the bidder.

**Toronto, Hamilton & Buffalo.**—A judgment amounting to \$108,391 has been secured against the Toronto, Hamilton & Buffalo R. Co., the Dominion Construction Co., and E. B. Wingate by Goode & Co. the Chicago contractors who built the Welland branch of the Toronto, Hamilton & Buffalo Ry., the contract price for which was \$300,000. The sum named in the judgment is what is alleged to be still due them on the contracts.

Plans and specifications have been completed for a proposed spur,  $1\frac{1}{4}$  miles in length, to connect the road with the Toronto branch of the Grand Trunk at Hamilton, Ont., and it is expected to begin construction about May 15. This extension is to be built in consequence of the 50-year agreement between the Grand Trunk and the Canadian Pacific, whereby the latter secured running powers over the Grand Trunk tracks between Hamilton and Toronto. The Canadian Pacific will use its own engines from Toronto over the Grand Trunk, and from Hamilton over the Toronto, Hamilton & Buffalo to Buffalo.

**Wheeling & Lake Erie.**—It is reported that the Wheeling & Lake Erie road is preparing to make some extensive improvements in the line, and it is claimed that when all plans have been carried out, the physical condition of this road will be second to none. In speaking of these improvements, General Superintendent Blickensderfer is quoted as saying: "We have already begun to lay ten miles of 70 lb. steel rails near Massillon. All of the bridges will be replaced by steel structures, and a large sum of money will be expended on the roadbed. The work on the company's new rapid coal-loading machine at the Huron dock is progressing rapidly. It is expected that this machine will be in operation this season."

## NEW ROADS AND PROJECTS.

**Illinois.**—On May 9, articles of incorporation were filed with the secretary of state at Springfield, Ill., for the Rock Island & Eastern Illinois Railway Company. It is proposed to construct and operate a railroad from a point at the southern limits of Chicago to and through the cities of Rock Island, Moline and Port Byron Junction. The incorporators and first board of directors are: W. C. Wadsworth and C. C. Hipwell, of Davenport, Iowa; F. P. Blair, St. Paul, Minn.; V. M. Blanding and John Crubaugh, of Rock Island, Ill. The principal offices will be at Rock Island and the capital stock is \$100,000.

Articles were also filed by the Illinois Mineral Railroad Company. It is proposed to build and operate a railroad from the east point of Clark county to a point on the Mississippi river opposite St. Louis. The incorporators and first board of directors are Thomas W. Scott, Fairfield; Rice, Alton; C. J. Whitney, Alton; J. H. Bethune and E. C. Rice, of St. Louis, Mo. The general offices are to be at East St. Louis, Ill. Capital stock, \$10,000.

The Glen Oak & Prospect Heights R. Co. has filed articles of incorporation in Illinois, and the company proposes to construct and maintain a railroad from Peoria through the county of Peoria to Prospect Park, Peoria county. The incorporators and first board of directors are Monroe Seiberling, A. G. Seiberling, Frank L. Kryder, C. J. Butler and Fred Patee, of Peoria; J. H. Seiberling, Dowelstown, Ohio, and William E. Avery, of Detroit, Mich. The headquarters of this road will be at Peoria. Capital stock, \$100,000.

**Kentucky.**—A project to build a road under the name of Bowling Green & Northern, is now being revived by a syndicate which has issued a circular to property owners along the proposed line of the railway asking for bonuses. It is said that this company intends beginning construction in a few weeks of the 50 miles of road, connecting the Louisville & Nashville and the Chesapeake, Ohio & Southwestern by a shorter route. It is also stated that surveys are completed, much of the right of way obtained, and the promoters will be ready to receive bids in the near future. This line passes through a heavily timbered region, and through one of the finest coalfields of the south. It is less than 70 mile from Louisville. Iron ore of an excellent quality is also found. The line will be independent, and connect with both the Louisville & Nashville and Chesapeake, Ohio & Southwestern which is now practically a part of the Illinois Central, and will develop an entirely new territory.

The Kentucky Railroad Co. has been organized to build a railway from Pine Springs to West Liberty, a distance of 43 miles. The grading and tracklaying is now completed from Pine Springs to Rodbourn, Rowan county, 18 miles. The line is being built by the Hixson-Rodbourn Lumber Co., in the interests of its business, and the company is doing its own construction. Mr. W. W. Reynolds is superintendent of the company.

**Minnesota.**—On May 7 a meeting was held at Crookston, composed of the officers and directors of three railroad projects, contemplating the building of lines into Duluth. One line is the road being built by Mr. D. W. Hines and called the Duluth & North Dakota, and the others are the Crookston, Rainy Lake & Pacific and the North Dakota & Minnesota Central railroads, each of which has a Mr. Steenerson for a president. These men in all numbering 30 of the brainy and leading business men of the valley, spent the day discussing projects and formulating plans for a combination of interests which will bring success out of their desires. The plan they will promulgate will be to ask Polk county to bond itself in a sum possibly as great as \$300,000 for which it will receive stock of the road in the same

amount. This sum will be used to build the stretch of road through the timber south of Red Lake reservation from Polk county on the east to Deer river. This will then leave the three roads to work out their own salvation as to grading through the valley counties, and the result will certainly be a success unless the present temper of the farmers is cooled very materially. The farmers are willingly subscribing for \$100 share of stock for each quarter section of land they own, and this will place the road bed for the ties and iron. The money for this is already promised when the grade is ready for it, and thus it is believed that the Red river valley is to be brought into such rail connections with the markets as shall enhance the value of every acre of land which is cultivated therein, so that the subscribers to this fund will reap a goodly benefit.

**New York.**—The Lehigh & Lake Erie R. Co. was incorporated at Albany, N. Y., on May 7. The company will construct a standard gage steam road from a point on the Lehigh Valley railway about one-half mile west of its crossing at Union road in the town of Cheektowaga, Erie county, thence through the towns of Cheektowaga and West Seneca, to a point in Buffalo, known as the Tift Farm, a distance of 10 miles. The directors are E. P. Wilbur and Robert H. Sayre, of South Bethlehem, Pa.; Charles Hartshorn, of Merion Station, Pa.; John B. Garrett, of Rosemont, Pa.; Wilson S. Bissell, Arthur D. Bissell, Herbert P. Bissell, Martin Cary and Mark L. Luther, of Buffalo. The capital is divided into 2,500 shares, of which Mr. Wilbur subscribes for 2,430 shares. The duration of the corporation is placed at 99 years. Capital stock, \$250,000.

**North Dakota.**—A company has been incorporated to build a road from Fargo to Sherbrooke, a distance of 60 miles, passing through Hunter. The road will run through one of the most fertile sections of the Red river valley and tap a section not reached by any road. It is somewhat along the proposed extension of the Soo. Farmers along the route have signified their intention of aiding in the construction of the road. The following officers have been elected: President, Martin Hector; vice president, J. W. Smith; treasurer, John Vonmeida; secretary and general manager, Evan Styler. None except local capitalists are on the board of directors and the capital stock is fixed at \$300,000.

**Texas.**—A surveying party in the interests of the Texas Central has started from Albany, Shackelford county, and is proceeding in a northwesterly direction through Jones and other counties in the direction of Las Vegas, N. M. Messrs. Wm. T. Gould, resident engineer, and Jos. McWilliams, superintendent of the Texas Central, are at the head of the party. They have a full equipment of instruments and a corps of flagmen and chain bearers. The purpose is to locate a line for the Pacific extension of the Texas Central. The plan of the Texas Central is to extend from Albany, its northwestern terminus, to a connection in New Mexico with the transcontinental lines and from Waco to the Mississippi river. Col. Chas. Hamilton, vice president and general manager, is quoted as saying: "The engineers will complete the surveys. Building the extension will depend upon the course of future legislation."

Propositions have been submitted to the various places along the route of the proposed extension of the Texas Midland, which Mr. E. H. R. Green is contemplating building. The proposed line will be about 54 miles in length and will connect Greenville, the present terminus, with Paris. At Cooper, Mr. Leith, general manager of the Midland, has quietly bought up about \$20,000 worth of property near where the depot is to be located. This railway now extends from Ennis to Greenville, a distance of 73 miles.

A new corporation has been organized by the Link Line people and they now have a charter providing for the building of a line of railway from Austin to Belgrade, on the Sabine river. Representatives of this corporation appeared before the railroad commission at Austin May 7, with an application for authority to assume the bonded indebtedness of the Georgetown & Granger, and Trinity, Cameron & Western railways, and with a petition for the registration of the bonds previously authorized for those two corporations.

It is now said to be an assured fact that the construction of the Chicago, Weatherford & Brazos Valley road will begin immediately. The company has secured the services of Mr. F. H. Peters of Kansas City as civil engineer to survey the line from Weatherford to Bridgeport, who has finished making up his corps, and the outfit, consisting of 15 men, and has started for the camp a few miles from the city. It is expected that the line will be completed to Bridgeport in about four or five weeks.

It is reported that arrangements are under way by which the Galveston & Great Northern road will soon be commenced. This company organized and incorporated in the latter part of 1894 to build from Galveston to Lincoln, Neb., and at that time Capt. Edward Raemer, president of the road, went to Europe to place securities in Germany and England. He was unsuccessful, however, and nothing farther has been done until recently. Capt. Raemer is again in Europe and thinks there is now a flattering prospect for success. A great deal of the right of way has already been secured, and also wharfage at Galveston for a line of steamers connected with the road.

**West Virginia.**—It is now stated that construction is about to begin on the Glen Jean Lower Loup & Deepwater railroad. All the surveys were completed for this line last August, but no further work was done. It is to run from Glen Jean to Deepwater, on the Kanawha river, a distance of 24 miles, and the traffic will be principally coal and timber. Mr. J. W. Davis, of Lewisburg, W. Va., is president.

## INDUSTRIAL NOTES.

### Cars and Locomotives.

—The Erie Railroad has added to its equipment a new and attractive feature in the shape of library and observation cars, which will be run daily between New York and Cincinnati on its vestibuled limited trains leaving New York at 2 p. m. and Cincinnati at 6:25 p. m. These observation cars, the "Arcturus," "Nysa," "Fingal" and "Olean," are latest productions of the Pullman company and are beautiful examples of the car-builder's art. They are 68 ft. in length and finished in polished mahogany. The forward half is fitted with berths, and the observation apartment, occupying the rear part of the car, is luxuriously equipped with easy chairs, settees, tables, library, writing desk, etc. The windows at the sides are broad and low, while the glass in the rear windows and door extends to the floor, giving passengers an unobstructed view of the scenery.

—The annual report of the Burlington, Cedar Rapids & Northern Railway states that during the present year 10,000 tons of 80 lb. steel rails will be laid, 200 stock cars, 3 first-class passenger locomotives, and 4 switch engines will be purchased, and new freight warehouses will be erected at Burlington and Cedar Rapids.

—Two hundred freight cars are to be built by the Central of Georgia at its shops in Savannah during the summer.

—The Snow Locomotive Company, of Chicago, Ill., has been incorporated by P. P. Wood, Chas. A. Stroude and A. F. Durant. The capital stock is \$125,000.

—The Westmoreland Coal Company is in the market for 100 coal cars.

—H. K. Porter & Co. will furnish 10 compressed air motors for the Columbian & Maryland road.

—The Boyden Brake Company, of Baltimore, has received the order for the air brake equipment of the new locomotives which the Seaboard Air Line is having built at the Pittsburgh Locomotive Works. The equipment will be of the most modern form and complete in every respect, including driver and tender brakes and the pneumatic train signal. The Boyden Company is also furnishing the freight car equipment for the new cars which the same company is having built at its Portsmouth shops.

—The roundhouse at Somerset, Ky., and 12 locomotives belonging to the Queen and Crescent Railroad Company were destroyed by fire May 7. The loss is \$390,000, fully insured. The depot at this place was burned a year ago.

—The officials of the Lehigh Valley Railroad are negotiating for the purchase of 25 locomotives, of which 20 are to be freight engines and 5 passenger.

—The Standard coupler has been specified on the 1,000 cars now being built for the Lehigh Valley Railroad.

—Mr. John Hickey, superintendent of motive power of the Northern Pacific Railroad, is engaged upon the conversion of 5,000 box cars of 40,000 lbs. capacity into 50,000 lbs. capacity cars. The changes which are made do not increase the weight of the cars materially and the cost of the work is said to be exceedingly low. This reinforcement consists principally in strengthening the bolsters, which are built up of steel plates and pressed steel base plates. The latter plates and the center plates are to be furnished by the Schoen Pressed Steel Co., of Pittsburgh, and this constitutes a large order for this material. It has been reported that these cars were to be rebuilt but this is not the case. They are to be reinforced for handling grain and are to be completed in about four months for the approaching harvest. These alterations will enable the present equipment to carry the additional grain which would be handled by 1,000 new 50,000 lb. cars, and as the cost of the changes is to be low, the plan is an exceedingly interesting one and one which without doubt will be followed by other roads.

### Bridges.

—H. L. Hawkins, ordinary of Forsyth county, Ga., states that the letting of the contract for building a bridge at Strickland Ferry, Ga., has been postponed, in order to make some changes in the specifications.

—A dispatch from Albany announces that the contracts for the construction of the Porter avenue bridge in that city have been awarded. The Buffalo Dredging Co. receives the contract for the substructure work at \$19,497.75, while the Buffalo Bridge & Iron Works will do the superstructure at \$51,500.

—The street and park commissioners have awarded a contract for the construction of a new steel bridge across the Merrimac river, at Manchester, N. H., to the Groton Bridge & Mfg. Co., of Groton, N. Y. Price, \$97,100. The bridge is to be completed in four months from date of contract.

—Engineer Waldo, in charge of the preliminary work on the proposed new Missouri river railroad bridge at Yankton, has completed his work and was in Chicago, May 13, to submit his estimates to the representatives of the English syndicate which has the undertaking in charge.

—It is reported that the board of public works, Milwaukee, Wis., will soon begin the construction of a new bridge at Huron street, to cost about \$75,000.

—An iron and steel bridge across the Trent river near New Berne, N. C., will be built by the Atlantic & North Carolina Railroad Company, to replace the covered wooden one lately burned.

—Bids are asked by the auditor of Johnson county, Ia., until May 28 for constructing a bridge 600 ft long over Cedar river, and also a 300 ft. bridge over the Iowa river. Both bridges are to be on cylinder piers.

—The Maryland Steel Co., Sparrow's Point, is erecting two bridges for the Southern Railway, one 128 ft. long and the other 132 ft. long. The company also has in hand the Hoboken ferry house, New York City; a large mill building for the Spaulding & Jennings Co., Jersey City; steel frame work for the Newark (N. J.) Technical School and the clinical amphitheater for the Medico-Chirurgical Hospital, Philadelphia; two bridges for the South Jersey Railroad, besides a large amount of work of similar character for other people.

—Nelson & Buchanan, of Chambersburg, Pa., have been awarded the contract for a new iron bridge at Franklin street, Steelton, Pa. The bridge will replace an old structure and will be 63 x 32 ft. The contract was awarded by the county commissioners.

—The engineers of the Chesapeake & Ohio Railroad have been surveying a site for the new Ohio river bridge between Ironton and Ashland. The new bridge will likely be a five-span structure, the three channel spans cantilever and the end spans truss. The total length of the bridge, with viaducts, will be 4,000 ft. It will be used for street railway and steam cars, and will be the only bridge having a driveway between Cincinnati and Wheeling.

—The bids received April 24 for constructing the substructure for the drawbridge over the Quinnipiac river at Grand avenue, New Haven, Conn., were as follows: Sparks & Evans, Philadelphia, Pa., sandstone, \$80,457; pivot on filling sandstone, \$55,927; coffer dam, \$62,491; granite, \$68,057; pivot on piling, \$63,527; coffer dam, \$70,091. C. W. Blakeslee & Sons, sandstone, \$71,632; granite, \$75,375; pivot by pneumatic sandstone, \$71,632; pivot on piling \$60,132. Connor Bros., sandstone, \$67,016; pivot on piles, \$61,576. SooySmith & Son, New York, N. Y., three piers pneumatic sandstone, \$76,448; same granite, \$76,848. A. Redfield & Son, \$74,716; pivot on piling, \$69,551. John J. Geary, granite, \$104,930; pneumatic center granite, \$112,200. It is stated that all bids were rejected, and the work will be readvertised.

### Buildings.

—The Wheeling (W. Va.) Intelligencer is authority for the statement that the Aetna-Standard Iron and Steel Co. is considering the erection of a large addition to its already large iron making establishment in Aetnaville, across the river. The addition being considered by the directors of the company is a steel making plant. Heretofore the Aetna-Standard has been getting the steel that was used in the manufacture of its tin plate from outside sources. Recently the board of directors of the company directed the management to prepare plans and specifications for the erection of a steel plant at as low a cost as possible. The management is now at work on these plans, it is said, and will shortly be in a position to make a report to the board of directors. Unless the cost of the addition is unexpectedly large, it is said the directors will decide to build the steel plant, work to be started this summer and pushed through as rapidly as possible.

—The Portland Co. of Portland, Me., builders of locomotives, cars, boilers and marine engines, is to at once construct a new foundry which will be 208x80 ft.

—The Ball-Bearing Car Wheel & Manufacturing Co., Cleveland, Ohio, has increased its capital stock from \$50,000 to \$125,000. It will erect a four-story brick building, 50x108 ft., and a one-story building of the same dimensions.

—J. H. Day & Co., of Cincinnati, Ohio, will build a machine shop to cover a space of about 200x250 ft., which will be devoted to the construction of special machinery.

—The Brooklyn Heights Railroad Co. is reported to be receiving bids for a new car and machine shop to cost \$75,000. The building will be equipped with new tools and machinery, and it is said that about 300 men will be employed.

—The Pennsylvania Steel Co., Steelton, Pa., will erect a building for the manufacturing of tools, such as picks, shovels, etc., and will put in machinery for this line of manufacture.

—The terms of purchase of the ground occupied by the Fleming Boiler Works, at New Castle, by the Elliott-Washington Steel Co., do not require the removal until July 15, at which time the work of the erecting the new building will be commenced and pushed rapidly to completion. The latter company has sufficient orders ahead at the present time to keep the works running night and day until the first of September.

—The Southern Railway Co. will build a new brick roundhouse with its new railway buildings at Charlotte, N. C. The roundhouse will accommodate 22 locomotives.

—The railroad shops of the Chicago & Northwestern in Boone, Ill., are to be largely increased in the near future. Their facilities have not kept pace with the increase in the motive power and rolling stock of the road, and while the engines were new and needed but trifling repairs, the present shops, though at times badly crowded, managed to turn out the work. With a revival of business will come a necessary increase in work for the shops, and it is thought about 300 men will be employed in Boone in addition to the present force.

—The report in our last week's issue that the Seaboard Air Line will rebuild its shops at Raleigh, N. C., was incorrect. The company states that nothing has as yet been determined upon in regard to rebuilding the plant.

—It is stated that the Westinghouse Electric and Manufacturing Co. proposes to add two more shops to its mammoth plant at East Pittsburgh. Each will be 500 ft. long and of the style of those already in operation. The new factories will be located on the site originally designed for extended improvements.

#### Iron and Steel.

—One of the largest castings ever made in this country was recently turned out at a foundry in Pittsfield, Mass. It was a plate for the Berkshire Glass Works, weighing 9,000 lbs., was 14 ft. long, and 44 in. wide and 5 in. thick.

—The Board of Trade of New Decatur, Ala., is considering a proposition for the resumption of operations at the New Decatur furnace; also for the establishment of several industries.

—The Wabash Railway has just received from the Carnegie mills 9,000 tons of 80 lbs. steel rails, for laying on various portions of its main line. The 80-lb. is to be the standard hereafter.

—In his annual report to the stockholders General Manager Felton, of the Pennsylvania Steel Company, warmly recommends the erection of additional hot ovens at the blast furnaces to increase the capacity of the hot blast.

—Ground is being excavated for a bolt and nut works plant at North Birmingham, Ala. The Wilson Iron Works Co., is the projector.

—Robert J. McIntyre, of Catasauqua, Pa., has received a contract for 400 iron columns, to be used in the construction of a Baltimore & Ohio depot on Staten Island, N. Y.

—The court at Columbus (O.) has refused to grant a receiver for Columbus & Hocking Coal & Iron Co., on the ground that the company is abundantly solvent, is not mismanaged, and has not been diverting its funds. The property is ordered restored to the stockholders.

—The New Carnegie furnace at Duquesne, Pa., which was put in operation this month, is stated to be the largest in the United States. Its cost is nearly half a million dollars and the production will reach 1,000 tons a day. The second one, the same size, will be completed the first of October. The Carnegie plants consume 2,500,000 tons of ore yearly and after October will require 500,000 tons more.

—The Union Iron Works, of San Francisco, Cal., recently shipped nine steel barges to Russia to be used for the navigation of Siberian rivers in connection with the construction of the Trans-Siberian Railway.

—The steel works and blast furnace departments at the Edgar Thomson Works at Braddock, are to be consolidated. D. G. Kerr will remain in charge of the furnaces, but the laboratories, time-keeping forces, clerks, under superintendents and foremen will all be concentrated under one head. The new foundry department is included in the change.

—The Vulcan Iron Works, San Francisco, Cal., were destroyed by fire on May 10. The loss is estimated at \$100,000, with \$31,000 insurance. The fire communicated to the third floor of the Reliance Machine Works, damaging the building slightly and destroying considerable stock. The loss of the Reliance Company is more than covered by the \$25,000 insurance on the plant.

—The Maryland Steel Co. has completed the purchase of 50,000 tons of iron ore from a new mine recently located at Conception Bay, Newfoundland, and the ore will be shipped during the coming summer to Philadelphia and Baltimore. The mines are owned by the Nova Scotia Steel Co., of New Glasgow, which corporation has everything in readiness for the shipments. The contract for the carrying of the ore has been arranged. These will be the first shipments from the mines. The percentage of iron in the ore is said to be above the average of domestic ore.

—The new steel plant on Breker Island, near Albany, is progressing rapidly, and when completed it will be one of the largest steel plants in the world. The boiler house has a complement of 3,000 horse power boilers. The engine now being erected is one of the largest of its kind ever built. It is a compound double-tandem, blowing engine, with twenty-eight, fifty and sixty-inch cylinders and sixty-inch strokes and weighs over 600,000 lbs. The water pumping and condensing machinery are all in place, and will be ready to start as soon as the suction pipes are completed. They consist of a triple expansion 7,000,000 gallon pumping engine, one 3,000,000 gallon compound pumping engine, and one 3,000 horse power independent condenser.

#### Machinery and Tools.

—Mr. Spencer Miller, engineer of the cableway department of the Lidgerwood Manufacturing Co., New York City, has returned from a four months' visit to Europe, much improved in health and bringing with him all the American rights under the patents of the Temperley transporter which the Lidgerwood Mfg. Co., will immediately place upon the market. The transporter is a hoisting and conveying device employing a suspended beam as a trackway. The chief points in its favor are simplicity in operation, low cost and extreme flexibility. No skill whatever is required to operate this apparatus. About 300 transporters have already been made and the device has therefore passed through its experimental stage. The British admiralty having adopted the Temperley transporter for coaling battleships, have recently purchased nearly 100 of them. Mr. Miller also secured a contract in Paris from the new Panama Canal Co., for seven cableways which were shipped April 30 to Panama. This same gentleman has recently had a patent granted

him for a novel form of scoop bucket, which has been thoroughly tested, and has proved entirely satisfactory in loam and sand. It is employed on a cableway. The bucket is lowered to the toe of the sand bank, and the carriage is run ahead so that the draw of the hoist rope is approximately parallel with the slope of the bank and the bucket is drawn up, thereby filling it. If the material be soft the bucket will fill without guidance, but in harder material the bucket has to be guided by a man following it. The bucket is then conveyed back to the place of dumping, and by virtue of lowering the bucket it is overturned and the load spilled. Mr. Miller has also another patent granted him for a novel form of aerial dumping device.

—The Link Belt Machinery Co. of Chicago, has issued a standard size (6 x 9 in.) pamphlet which is known as catalog No. 21 devoted to illustrated descriptions of modern methods as applied by this company to the handling of sugar cane and its products. This embodies illustrated matter pertaining to the transmission of power by manilla rope, shafting and gearing of various kinds, as applied to elevating and conveying machinery and much of the work shown while of the nature of special machinery applied to the processes incident to the manufacture of sugar, are also suggestive in regard to the handling of materials in other branches of manufacturing. For instance, one of the illustrations shows an endless freight carrier, designed and erected by the Link Belt Machinery Co. for the Chicago Sugar Refining Company. This conveyor is 435 ft. in length and may be used for the movement of barrels sacks or packages. The illustration shows the carrier in the act of transportation 75 barrels which with their contents weigh 700 lbs. each. The car has an adjustable end provided with a rise and fall of 16 feet for the purpose of meeting different conditions of elevation of the decks of vessels from which the cargoes are unloaded. The catalog includes a number of illustrations of shafting attachments such as bearings, pulleys and couplings. The style and quality of the work are in accordance with previous catalogs of this character issued by this company.

—The Vulcan Iron Works Co., Toledo is making two large steam shovels for the Oliver Mining Co. of Virginia, Minn. The machines will weigh 93 tons each and capable of moving 4500 tons in 10 hours.

—The Harrisburg Foundry & Machine Works, Harrisburg, Pa., is increasing its plant, and will put in additional lathes, planers, etc.

—Thomas Carlin's Sons, Allegheny, have made some heavy eastern shipments of their patent grinding and other machinery. An air compressor and several new labor saving devices have lately been added to their already complete machine equipment. Several heavy orders in their boiler and foundry departments have been booked. This firm handled last year not including river shipments or city orders, 460 as a gain of 76 cars as compared with the previous year which amounted to 384 cars.

—The Middletown (Pa.) Car Works is building an addition to the plant and will want new machinery for car building.

—The Ohio Machine Tool Co., of Kenton, is running its plant to its full capacity, having been compelled to run with a night force, and even with this it is behind its orders.

—The Niles Tool Works, Hamilton, Ohio., has just completed fitting with machinery, tools, etc., the new boiler shops of John Mohr & Son at South Chicago, Ill.

—J. A. Little, A. W. Pollock, W. H. Borland, and others of Washington, have organized a company for the manufacture of steel tools, and will apply for a charter at once. The capital of the new company is \$20,000. A plant will be erected and employment given a large number of men.

—Mr. George Place, the well known machinery agent of New York, and the George Place Machine Co., of which Mr. Place is the president, and H. M. Livor, another and equally well known and experienced machinery man, is the treasurer and manager, have removed from their headquarters 145 Broadway, back to the Equitable building, No. 120 Broadway. Mr. Place was formerly in these same rooms. He will continue as New York agent for J. A. Fay & Egan Co., making a specialty besides its tools of railway machinery, in which line he is doubtless the best known and most successful man in the east. The warehouses of the George Place Machinery Co. are 511 and 513 West 13th street, where Mr. Livor will make his headquarters and conduct its large general machine tool business. This change of base was made necessary by the purchase, by the Washington Life Insurance Co., of the buildings fronting on Broadway, and extending for half a block on Liberty street, on which it will erect a great office building. That company paid the neat sum of \$1,250,000 for the ground.

—The Erie Railroad has contracted with the Dodge Coal Storage Co., whose works are at Nicetown, this state, for a 150,000 ton storage plant at East Buffalo, N. Y. The coal will be stocked in nine divisions or piles, each of about 17,000 tons capacity. The plant will be constructed under the patents of the Dodge system, with the latest improvements, including a complete haulage system for handling the cars.

#### Miscellaneous.

—The Gutta Percha & Rubber Mfg. Co., of Chicago, has sent out a standard size (6 x 9 in.) catalog and special price list of the maltese cross hose. This is a pamphlet of 26 pages and contains an illustrated list of couplings, clamps, nozzles, sprinklers, hose reels, and other hose fittings and attachments.

—It is stated that the Grand Trunk Railway will shortly adopt a new rail section. The main line rail at present weighs 79 lbs. to the yard and the rail in use on branch lines only 57½ lbs. A careful comparison of results led to the adoption of the new rail, which is five inches in height, five inches across the base and weighs 80 lbs. to the yard. The new rail will be put down in small sections, as the rails at present in use give out. The first consignment will arrive from England this month.

—A system of wire rope tramways will be built near Telluride, Colo., to connect a number of mines; it will be an aerial gravity tramway for transporting ore, merchandise and other articles that can be carried in buckets; capital stock, \$200,000. The incorporators are David Swickheimer, A. J. Clark, Walter Beam and others.

—The Ball Bearing Co., which has a newly equipped factory in Boston and has its main office in the Hancock Insurance Company's building, has opened an office also at 51 Oliver street, Boston.

—At the annual meeting of the stockholders of the Youngstown Car Mfg. Co., Youngstown, Ohio, the old officials were reelected, consisting of L. E. Cochran, president; B. F. Boyd, secretary and treasurer, and Andrew Milliken, general manager.

—The Acme Fence Company has leased the Monon machine shops at New Albany, Ind., and will occupy them by May 15. All the necessary machinery, together with the foundry, will be put in. The company has the contract for the manufacture of the Hauss mail catcher soon to be placed on a number of the prominent railroads.

—A declaration has been filed asking for a commission for the Calhoun Falls Co., at Augusta, Ga. Pat Calhoun, Alex C. King, William P. Calhoun, all of Atlanta, and Granville Beal of Abbeville, are the incorporators, owning 12,000 acres of land in Abbeville county and 4,000 in Elbert county. The objects of the company are building and operating factories, laying out and settling towns, constructing canals, waterways and railroads and building electric plants. The capital stock is \$2,050,000 divided into 20,500 shares at \$100 per share.

—Judging from the number of copies of the subway specifications taken out, there will be no lack of bidders for the work of sinking the Reading Railroad tracks along Pennsylvania avenue. Of the more than sixty copies taken by contractors a number are to cover the entire operation, while others are for certain sections only. Chief Engineer Webster says there was no doubt that the work would come within the appropriation. Bids were received until noon of May 12, the last day provided for that purpose. Among those who have secured copies of the specifications are all the large railroad and other contractors in that section of the country.

—The LaRose Car Brake Company has decided to locate at New Bedford, Mass. The capital will be \$50,000.

—The committee of the United States senate on the District of Columbia, to whom was referred the bill to permit the Pintsch Compressing Company to lay pipes in certain streets of the District of Columbia, has made a favorable report. The bill provides for laying pipes to connect the works of the company with the river and with the Baltimore & Ohio and the Baltimore & Potomac stations and with yards of the Southern Railway. Pintsch gas is used for lighting railroad cars and buoys. The object to be gained is the lighting of the railway mail cars starting from Washington, thus doing away with the oil lamps, so dangerous in railway mail cars especially; also the furnishing of gas for lighted buoys on the Potomac. When this plant has been established the B. & O. R. R. will probably use the Pintsch light on all its Washington and Metropolitan branch trains. It is already in use on the Royal Blue Line trains, the supply being obtained at Jersey City.

—The Q. & C. Co. has sent out two pamphlets, standard size (9x12 in.), one of which is devoted to explaining the qualities of the wood preservative known as "Q. & C. Carbolineum," giving a list of the principal uses to which it has been put, and explaining its action in the preservation of wood. The second pamphlet is of 16 pages, being the advance sheets of the 1896 catalog of the Q. & C. Co. which is devoted to an illustrated description of the Dunham and Q. & C. trolley freight car doors, with a few of the last pages occupied by some of the other specialties of the company, including the Williams valve setting device, the McKee brake slack adjuster, the Globe ventilator and the Q. & C. sawing machines.

—The New York Belting & Packing Co., Ltd. has removed from 15 Park row to 25 Park place and 22 Murray st., New York City. The new store is located in the center of the business district only two blocks away from the old building. Extending entirely through from Park place to Murray street, the building is spacious, well lighted and systematically arranged. The entrance is on Park place, the Murray street side being reserved entirely for shipping purposes. The tire department is a prominent feature in the new store, and necessarily so, for when it is remembered that almost every able bodied man, woman and child in the country either rides a bicycle or aims to do so, it is easy to understand that the demand for "League" tires is urgent. But while the tire department is a special feature, ample space is reserved to exhibit a full and varied stock of belting, hose, packing, tubing, jar rings and a hundred other items of almost equal importance. The reputation of the company for high grade goods is too well established to need comment, but it is perhaps not so well known that they have been making the same goods for fifty years, day in and day out, without intermission. The company invites its friends to call and inspect the new building.